DISCARD

From the collection of the




San Francisco, California
2007


Digitized by the Internet Archive
in 2007 with funding from
Microsoft Corporation

http://www.archive.org/details/electricrailwayj64mcgrrich

McGraw-Hill Company, Inc. November 1, 1924 Twenty Cents Per Copy

143

# ELECTRIC RAILWAY JOURNAL




*Combination Torch cuts or welds by a change of tips.*

HOUSTON PUBLIC LIBRARY
LYCEUM AND CARNEGIE BRANCH
HOUSTON, TEXAS.

# MILBURN
## SUPER TIPS



*with*

## Welding and Cutting Torches

***save upwards of 18% in operating costs***

Milburn Super-Tips add velocity and penetration to the preheating and cutting oxygen, increase speed and decrease gas consumption. Seats are renewable at a nominal cost; save time and handling.

During a recent test the following savings were effected with the Milburn Super-Tip

| Thickness of metal | 1 in. | 3 in. | 4 in. |
|---|---|---|---|
| Time | 11.6% | 13.4% | 16.4% |
| Oxygen | 8.3% | 23.6% | 27.7% |
| Acetylene | 35.2% | 40.8% | 24.2% |
| Average saving with "SUPER-TIPS". | 18.4% | 25.9% | 22.8% |

**Torches** **Generators** **Preheaters**
**Regulators** **Compressor Plants** **Accessories**

**The ALEXANDER MILBURN COMPANY**
1416-1428 W. Baltimore St.
BALTIMORE, MD.

MILBURN

# Last Call!

**The Seers Predict a Severe Winter**





No. 532-B Motor

**Prepare For Winter**

## *Preparedness Results in Better Service and Lower Maintenance*

Are your snow sweepers overhauled and tested?

Have the snow plows been amply motored to withstand the worst storms of the coming winter?

If not: review the splendid line of standard Westinghouse Motors ready for prompt shipment, to put your snow-fighting equipment in shape for the winter conditions.

Authorize your stores department to carry an ample stock of insulation and renewal parts to keep your rolling equipment in service through any possible weather emergency. ***This is good insurance.***

The nearest Westinghouse office is ready to cooperate and assist in the solution of any transportation problems. Discuss your problems with our representative. ***He is there to serve you.***



No. 535 Motor

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in all Principal Cities of the
United States and Foreign Countries.



No. 557 Motor

# Westinghouse

Vol. 64, No. 18 New York, November 1, 1924 55-792

# ELECTRIC RAILWAY JOURNAL

MORRIS BUCK
Associate Editor
C. W. SQUIER
Associate Editor
JOHN A. MILLER, JR.
Assistant Editor
G. J. MACMURRAY
News Editor

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

CHARLES GORDON
Western Editor
Old Colony Bldg., Chicago
MERRILL B. KNOX
Editorial Assistant
Old Colony Bldg., Chicago
CARL W. STOCKS
Associate Editor

## CONTENTS

**Editorials** ..... 755

**Modernizing the Denver Tramway Power Plant** ..... 757
Faced with an urgent need for increased power supply, and unable to buy additional power advantageously, the Denver Tramway has increased the capacity of its Platte Street plant so as to meet all of its needs for a number of years.

**Medium-Weight Low-Floor Cars in Des Moines** ..... 761

**Auto Truck Sands Track in Utica** ..... 762

**Careful Engagement Reduces Turnover** ..... 763
The method of engaging trainmen on the system of the United Railways of St. Louis has secured an excellent selection and the turnover has become negligible. The forms used in employing and training men show the care used.

**Chicago Surface Lines Trying Roller Bearings** ..... 766

**Applications of Modern Methods in Accounting Practice** 767
BY W. L. DAVIS.
In this concluding installment of this series on present-day electric railway accounting practice, the principal topics discussed are budgets, fixed capital records, daily and weekly reports and the use of machines in accounting offices.

**Educational Program in Boston** ..... 770
Boston Elevated Railway announces five series of departmental group conferences for employees, with other advanced courses. Arrangement with Massachusetts Department of Education effected.

**Buying Coal for Employees of a Small Railway** ..... 770

**Tracks Used by Railway for Local Freight-Haulage** ... 771
BY F. W. WATTS.

**Association News and Discussions** ..... 772

**Lay Your Money on the Counter** ..... 772
BY W. P. STRANDBORG.
The way to tell the railway story is to buy space in the advertising section of the newspaper, not to beg space in the news columns.

**Job Analysis Promotes Safety** ..... 773
BY JOHN J. CONNORS.

**Progress of Anti-Friction Bearings** ..... 774
BY KARL PFORTE.

**Annual Mileage Output per Platform Man** ..... 775
BY K. NORREGAARD.

**Current-Checking Means for Cars, Carhouses and Shops** 776
BY WILHELM PFORR.

**American Association News** ..... 777

**Maintenance of Equipment** ..... 778

**News of the Industry** ..... 781

**McGraw-Hill Company, Inc., Tenth Ave. at 36th St., New York**

JAMES H. MCGRAW, President
ARTHUR J. BALDWIN, Vice-President
MALCOLM MUIR, Vice-President
E. J. MEHREN, Vice-President
MASON BRITTON, Vice-President
JAMES H. MCGRAW, JR., Vice-Pres. and Treas.
C. H. THOMPSON, Secretary

WASHINGTON: Colorado Building
CHICAGO: Old Colony Building
PHILADELPHIA: Real Estate Trust Building
CLEVELAND: Leader-News Building
ST. LOUIS: Star Building
SAN FRANCISCO: 883 Mission Street
LONDON: 6 Bouverie Street, London, E. C. 4

Cable Address: "Machinist, N. Y."

Publishers of
*Engineering News-Record*
*American Machinist*
*Power*
*Chemical and Metallurgical Engineering*
*Coal Age*
*Engineering and Mining Journal-Press*
*Ingeniería Internacional*
*Bus Transportation*
*Electric Railway Journal*
*Electrical World*
*Electrical Merchandising*
*Journal of Electricity*
*(Published in San Francisco)*
*Industrial Engineer*
*(Published in Chicago)*
*Electrical Retailing*
*(Published in Chicago)*
*American Machinist—European Edition*
*(Published in London)*

MEMBER AUDIT BUREAU OF CIRCULATIONS AERA 1924

Member Associated Business Papers, Inc.
Member Audit Bureau of Circulations

The annual subscription rate is $4 in the United States, Canada, Mexico, Alaska, Hawaii, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, Colombia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brazil, Spain, Uruguay, Costa Rica, Ecuador, Guatemala and Paraguay. Extra foreign postage to other countries $3 (total $7 or 28 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid to any part of the world, 20 cents.
Change of Address—When change of address is ordered the new and the old address must be given, notice to be received at least ten days before the change takes place.
Copyright, 1924, by McGraw-Hill Company, Inc.
Published weekly. Entered as second-class matter, June 23, 1908, at the Post Office, at New York, under the Act of March 3, 1879. Printed in U.S.A.

## *Webster Confirms It*

NOT long ago the railway in one of the largest cities of this country had occasion to refer to ELECTRIC RAILWAY JOURNAL in advertisements which it was using in its cars. In order more definitely to identify this paper in the minds of the general public, the explanatory phrase was used "Official Journal of the Railway Industry."

This indication of the high regard in which the management of that property holds the JOURNAL was gratifying to the editors. But the question arose whether a paper published independently and not controlled nor subsidized by the industry could properly be called "official." A look in the dictionary, however, showed that the author of the advertisement was entirely correct. Webster gives as the first meaning of the word official "discharging or performing an office, service or function." Under this definition the evidence constantly coming to hand confirms the statement referred to above — that the JOURNAL really does qualify as the "official" paper of the industry.

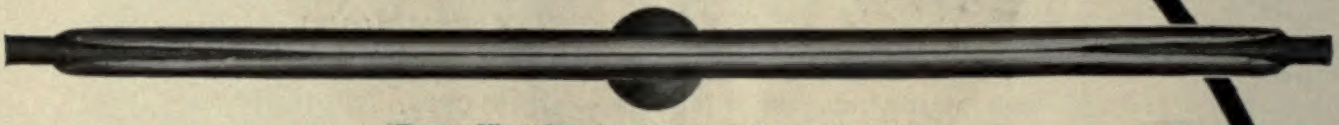
Number of Copies Printed, 6,150

Advertising Index—Alphabetical, 52; Classified, 48, 50; Searchlight, 46-47

# The Importance of Trolley-Ear Renewals

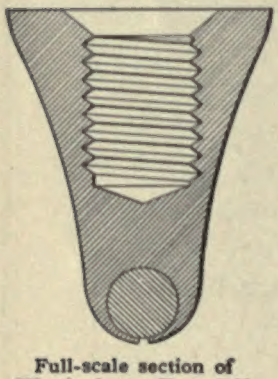


Westinghouse ET Low-Center Trolley Ear



Bottom View, Showing Lips Peened to Trolley Wire

The following quotations, from the report of the committee on Transmission and Distribution of the American Electric Railway Association on the Renewal of Trolley Ears, speak for themselves:



Full-scale section of Westinghouse Type ET Low-Center Trolley Ear. Height at Boss, 1¾ inches.

"No matter what the type of ear, it is most important that the ear should be renewed as soon as the metal in the lips, underneath the trolley wire, has become worn away."

"It will be found cheaper to renew the ears with greater frequency than is often the practice, rather than renew entire stretches of trolley wire."

The design of Westinghouse ET Low-Center Trolley Ears is such that the lips give the maximum protection to the trolley wire, assuring the longest service.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in all Principal Cities of the
United States and Foreign Countries.

# Westinghouse




# Stop the Thief

To steal the lamp bulb in one of these Imperial Headlights would require the art of an expert lock-picker. Or it might be done by carrying away the whole headlight. The bulb is key-locked into the special socket. The door is fastened with an eccentric locking socket that requires a special key.

Not only is this headlight theft-proof, but it is also thoroughly protected mechanically. The door is fitted with wired glass that has extra strength and will not drop out even if cracked. It is further protected by the grids.

In general appearance and illuminating characteristics this Imperial Headlight is like the standard flush-type ZP. For a low-priced, city type headlight guarded against theft of lamps and breakage, let us give you a complete report on this modified Imperial ZP.

**The Ohio Brass Co.**

**Mansfield, Ohio, U.S.A.**

TROLLEY MATERIAL — ELECTRIC RAILWAY CAR EQUIPMENT — RAIL BONDS — HIGH TENSION PORCELAIN INSULATORS — THIRD RAIL INSULATORS

NEW YORK — PHILADELPHIA — PITTSBURGH CHICAGO — CHARLESTON, W. VA. LOS ANGELES — SAN FRANCISCO — PARIS, FRANCE

Dominion Insulator & Mfg. Co., Limited Niagara Falls, Ontario, Canada

# The Coffin Prize Winner

Under the head of economies introduced in operation by the prize winner, The Northern Texas Traction Company, appears this:

> "The cost of maintenance of way and structures has come down from 2.5 cents per car mile in 1920 to 1.4 cents in 1924. Besides the effect of light-weight rolling stock in this figure, the extensive use of track-welding equipment and modern track tools have had a bearing on producing the results."

This prize winning property uses Railway Track-work Company's track grinders exclusively.

The grinders we show here and the "Ajax" welder are lowering maintenance of way costs on progressive roads throughout the length and breadth of this nation. How about your own road?

*Get a set of bulletins and a quotation*

**Railway Track-work Co.**

3132-48 East Thompson Street, Philadelphia

AGENTS:
Chester F. Gailor, 30 Church St., New York
Chas. N. Wood Co., Boston
Electrical Engineering & Mfg. Co., Pittsburgh
Atlas Railway Supply Co., Chicago
Equipment & Engineering Co., London

328



"Reciprocating" Track Grinder



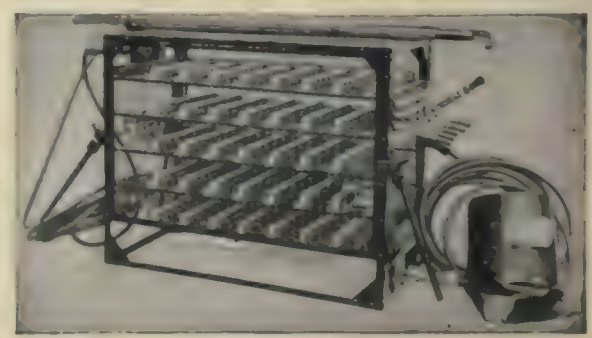
"Universal" Rotary Track Grinder



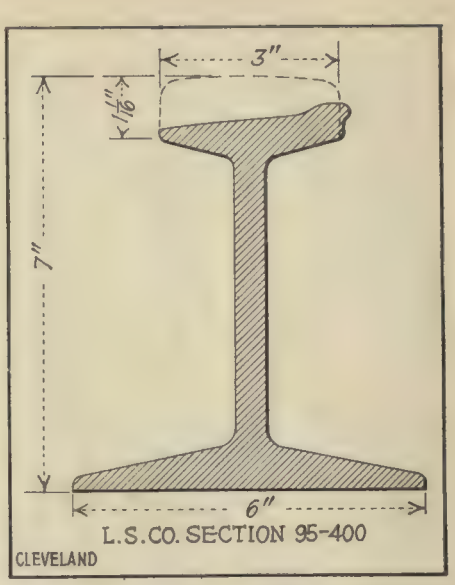
"Atlas" Rail Grinder



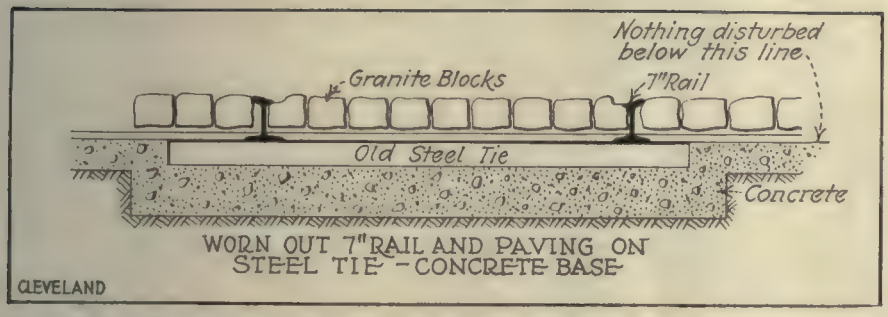
"Hercules" Swing Frame Rail Grinder



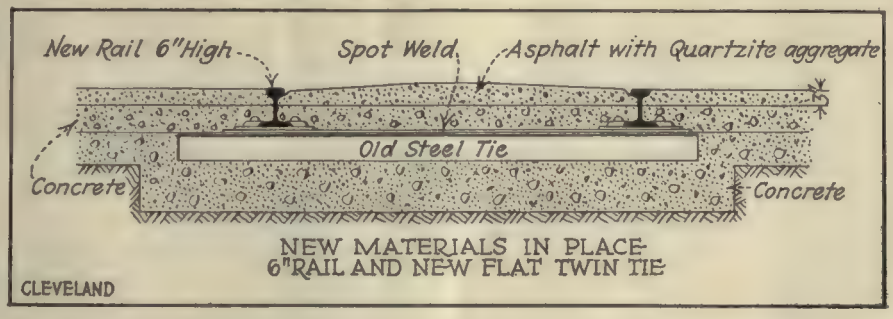
"Ajax" Electric Arc Welder




Cross Section of Rail on Euclid Ave., Cleveland, Showing Wear on Ball of Rail




Cross Section Showing Details of Track Construction on Euclid Avenue, Cleveland. Rail Worn Out, Concrete Base Still in Good Condition.




Details of method of Replacing Rail on Old Concrete Base, Using Special Flat Steel Twin Ties.

# Low Cost Construction that Outlasts the Rail

The most startling development in track construction for paved streets has been successfully worked out during the past two years in the renewal of rail and paving on a Steel Tie Concrete Base.

Planning your new paved track for renewal by using Steel Twin Tie Construction will require no large investment in initial cost. Our definite cost records for 1924 show costs as low as $8.35 per single track foot for the track complete, including removal of the old construction and concrete paving surface.

For conservative-minded executives who have questioned the comparative life of concrete construction there is a complete answer in the reconstruction of such track at the end of a satisfactory rail life in Cleveland and elsewhere.

In planning 1925 paved track construction investigate the low cost paved track construction that outlasts the rail with all assurance that asking us to present all the data by personal call or in the mail will involve no persistent or annoying solicitation.

**The International Steel Tie Co., Cleveland, Ohio**

# Steel Twin Tie Track

## Economical — Permanent — Renewable




★ Hundreds of thousands of Bates steel poles have been erected throughout this country, Europe and Asia. It is significant that they are today giving sturdy service under the stress of unusual loads, and the trying conditions of many climates.

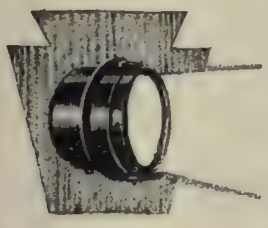
The rigorous storms of 1921 in this country, the stress of the sleet and ice loads of the winter of 1923, passed—without a single report being made about Bates poles having failed to stand! The permanency of Bates poles, the fundamental strength of the Bates section, has long been proved.

For permanent construction use Bates steel poles!

Bates Expanded Steel Truss Co.
Illinois Merchants Bank Bldg.
Chicago, Ill., U. S. A.

# BATES ONE PIECE EXPANDED STEEL POLES

# How KEYSTONE EQUIPMENT helps sell the service



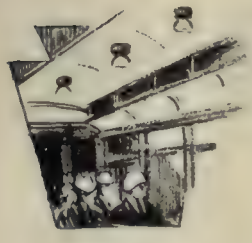
**GOLDEN GLOW HEADLIGHTS—*Distinguish the car!***

Despite darkness and distance, far up the road, the characteristic beam of golden yellow light announces the approach of a trolley. Golden Glow Headlights are non-glaring. They throw a flood of brilliant penetrating illumination, yet are non-dazzling.




**KEYSTONE-HUNTER SIGNS—*Advertise the service!***

They'll pass up the taxis, if your car signs help them to find their destinations. Few people willingly pay the higher cab fares, when street cars are readily available. Tell the public where your cars go. Advertise routes as well as destinations, with Keystone Hunter Signs.



**KEYSTONE COMPENSATING FIXTURES—*"Read While You Ride!"***

One series circuit of five fixtures gives ample and unfailing illumination for newspaper readers, and at the same time reduces costs. Wiring is simplified, bulb renewals are fewer and appearance is improved. Satisfactory lighting goes a long way toward making satisfied passengers.



**FARADAY SIGNAL SYSTEMS—*"Ring for your stop!"***

Don't make passengers wade through the crowd or stand on a seat to let the motorman know they want to stop. The installation of Faraday Signals—Buzzers and Push Buttons—makes it easy and convenient for passengers, and avoids carrying them past their streets.

***Ask for detailed specifications***




ELECTRIC SERVICE SUPPLIES CO.

PHILADELPHIA 17th and Cambria Sts.
PITTSBURGH 629 Oliver Building
NEW YORK 50 Church St.
SCRANTON 316 N. Washington Ave.
CHICAGO Monadnock Bldg.
BOSTON 88 Broad St.
Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver



# The WABCO Smile

A sense of satisfaction comes to all those who have experienced the benefits of WABCO Brake Cylinder Packing Cups.

The motorman feels secure in knowing that the air he puts into the cylinder will stay there to provide the degree of car control that he intends. No air can pass *through* WABCO cups, and they cling to the cylinder walls so tightly as to prevent leakage *around* them.

The shop man knows that his work of maintaining brake cylinders is lessened because WABCO cups do not need frequent replacement. They retain their effectiveness over very long periods even under severe service conditions. Neither do compressors come in so often for overhauling as they are not overworked to maintain cylinder leakage.

Moreover, the man who pays the bills is pleased with the economical advantages that follow the adoption of WABCO cups. They function better and wear longer, saving operating and maintenance expense.

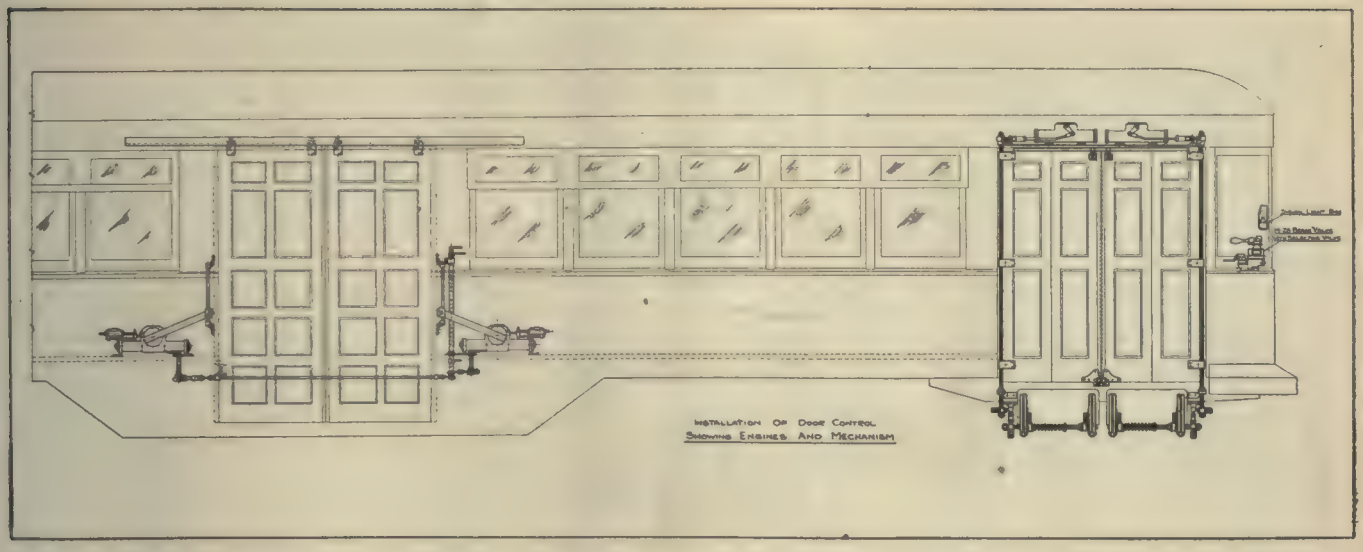
## WABCO

**WESTINGHOUSE TRACTION BRAKE CO.**

General Office and Works: WILMERDING, PA.

2141

# WESTINGHOUSE TRACTION BRAKES




# NATIONAL PNEUMATIC SERVICE

## What it means to you!

How to install door engines and when to install them for best results are big questions. But the assistance rendered by National Pneumatic Service goes beyond that. It helps you on problems of selective door control—on proper location and size of entrance and exit facilities—on interlocking safety features. In short, the one hundred percent kind of service goes with every National Pneumatic deal. And our follow-up service shoulders the responsibility for perfect performance.

## NATIONAL PNEUMATIC DEVICES

**Door Engines**
**Door and Step Control**
**Operating Mechanism**
**Motorman's Signal Lights**

## National Pneumatic Co., Inc.

*Originators and Manufacturers*

***Executive Office:*** **50 Church St., New York**

Philadelphia—1010 Colonial Trust Bldg. Chicago—940 McCormick Bldg.
General Works—Rahway, New Jersey
*Manufactured in Canada by*
Dominion Wheel & Foundries, Ltd., Toronto, Ont.





# Twenty-t
# Quantity Bo

This Motor Coach body, built by Auto Body, presents a striking appearance and is combined with rugged strength, durability and refined comfort. It is here shown mounted on a Reo chassis.



Since 1902 this organization has devoted its plant and personnel to the exclusive manufacture of automobile bodies. Throughout these years the facilities, the capacity and the co-operative spirit of the Auto Body Company have secured and held the business and good will of leaders in the automotive industry.

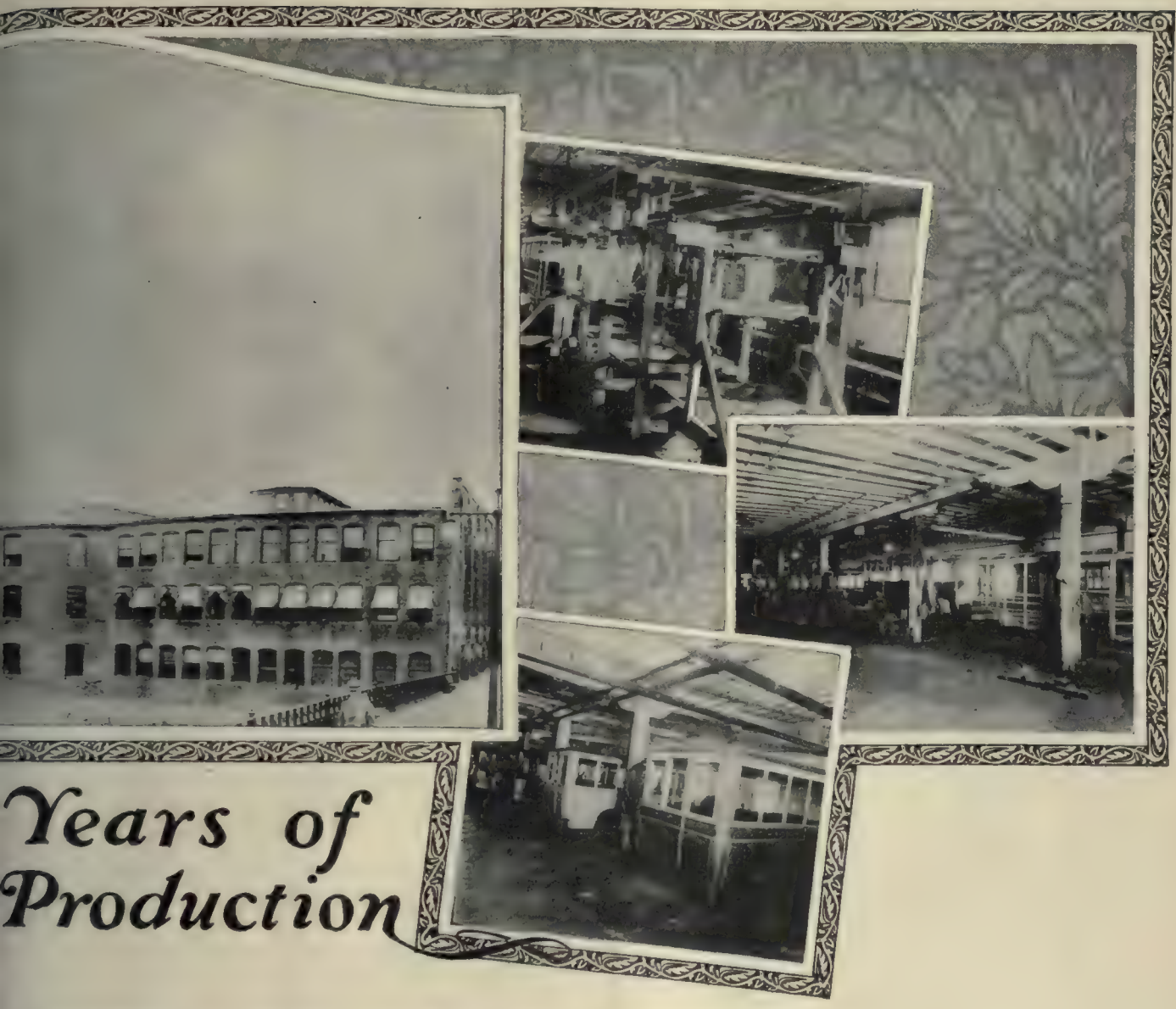
Engineering ability and manufacturing experience have been vital factors in the development of Auto Body Service.

THE AUTO BOD

*Designers and Manufacti*

*Open and Enc*

LANSING,



# Years of Production

Beginning with fabrication in the dry kilns, mill rooms, metal working, machine and die departments, through to the frame assembly, assembly line, painting and trimming departments—steel, wood and expert craftsmanship are here wrought into form—making every completed unit a high standard of durability, quality and appearance. The progress of production is expedited by adequate floor space, equipment and resources.

Let Auto Body engineers consider your problems. Wire or write for information.

Rugged Auto Body Pay-Enter Bus types have the stamina to withstand rough usage over a long period of service. These built-in Auto Body features are important to you economically.



COMPANY

*Motor Coach and Bus Bodies*
*omobile Bodies*

MICHIGAN

*Detroit Representative*
CHARLES. P. PARSONS
*1442 Majestic Building*

# For testing




## Available now — a real treatise on Bus operating practice—

Such a manual has been needed. Every day questions are confronting bus owners which, until now, have never been answered between book covers.

BUS OPERATING PRACTICE is the result of a painstaking research by Mack. It is a real treatise; an engineering, legal and reference book of 250 pages, written by specialists in different phases of bus operating practice.

You should have a copy as part of your reference library. It is the only book of its kind, written to meet a real need. Get in your request.

# out new territory—

EXPENSE and uncertainty absolutely prohibit experimenting with street car lines.

The Bus is ideal for such pioneer work because of the comparatively low initial investment and the flexibility of bus service. Buses doing such work may be transferred any time to other sections of the system if conditions make such transfer desirable, or the route can be altered with small expense to meet changing conditions.

Electric railways are rapidly including the bus in their transportation plans and fitting in bus service as an integral part of their systems. The low initial cost of buses solves many an experimental and financial problem. The steady, dependable and economical operation of Mack buses, combined with their pleasing lines and comfort places the Mack in the lead when it comes to a selection.

A Mack bus, from bumper to tail-light, is planned and built by Mack—worked out in every detail by Mack bus engineers and then built in the Mack plants. Mack supervision controls throughout.

The result of this is recognized in the sturdy long-life Mack engine.

In the specially designed low bus chassis.

In the wide front axle, assuring safety and permitting a short turning radius.

In the Mack dual reduction drive axle especially designed to give maximum road and under-body clearance.

In the Mack transmission with ground gears.

In the Mack Shock Insulator. (All spring ends are embedded in rubber Shock Insulator cushions, eliminating metallic contact between springs and frame, absorbing vibrations, affording yielding support to springs and banishing shackle wear, rattles, lubrication.)

And these are only a few of the many Mack features that help to assure the economies in daily operation and maintenance costs for which Mack buses are famous.

MACK TRUCKS, INC.

INTERNATIONAL MOTOR COMPANY

25 Broadway New York City

Builders of City and Sedan Type Buses

Eighty-three direct factory branches operate under the titles of: "MACK MOTOR TRUCK COMPANY" and "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION."

## The Mack Bus



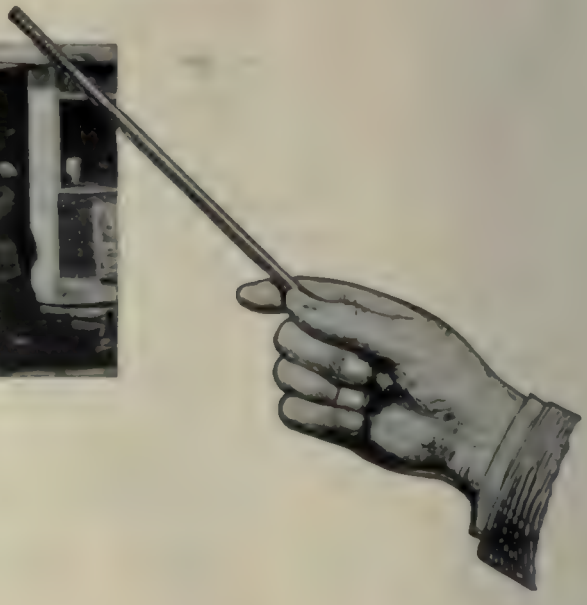
25 Passenger, City Type

*Performance counts!*

# MORE FREQUENT SERVICE

## —Makes More Car Riders—





## SAFETY CARS

With SAFETY CARS, you can afford to operate MORE cars, thus reducing headway, improving schedules and attracting increased patronage by giving increased service.

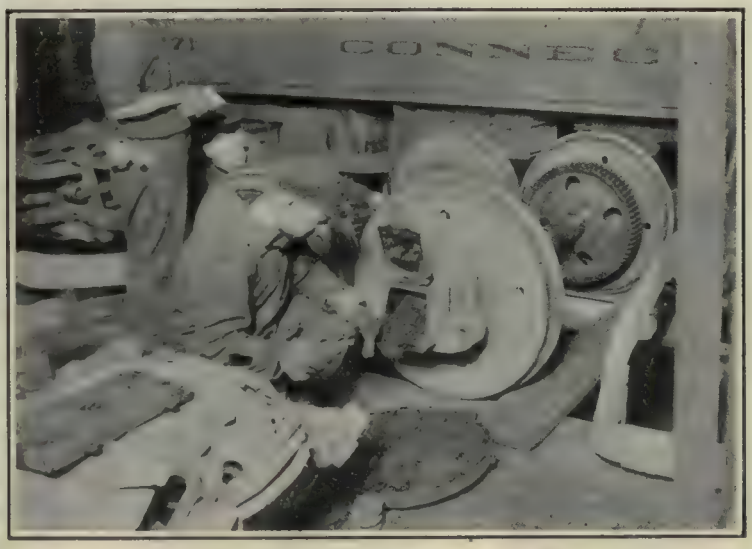


**SAFETY CAR DEVICES CO.**
OF ST. LOUIS, MO.

*Postal and Telegraphic Address:*
**WILMERDING, PA.**

CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH

# Galena Oils and Service



## Lubrication pennies save equipment dollars

The few cents difference in cost between using Galena Oils and ordinary oils in the initial lubrication of Electric railway equipment, amounts—on even the largest roads—to but a small sum.

And *after* the initial lubrication, the actual outlay for oil is even less with Galena than with the cheaper products, on account of its superior endurance and greater service yield.

But it is not only in mileage or Kilowatt hour output per gallon that Galena lubrication reveals its ultimate economy, but in the decided reduction of maintenance expense.

Lower depreciation through longer life to bearings and equipment; less time and labor spent on repair jobs; substantial reduction in fuel costs. These are the items that save many dollars, and represent savings made possible by the judicious investment of a few cents additional when installing your lubrication.

## Galena-Signal Oil Company

New York - Franklin, Pa. - Chicago

and offices in principal cities




# Stick to Known Value

One operator says: "G-E Coils couldn't be improved. So now they're packaged to guarantee original quality on the job."

There is no true substitute for G-E Armature Coils for G-E Motors. And now supplied in cartons, G-E Coils are sure to be preserved undamaged until ready for use. Besides, the cartons are a great convenience, each containing a set of coils for one armature.

To get the same efficiency as from your original coils, to secure maximum armature life, and to insure satisfactory service from your G-E Motors you must rewind with G-E Armature Coils. Each is an exact duplicate of the other.

Use your Catalog

**General Electric Company**
Schenectady, N. Y.
Sales Offices in all Large Cities

# GENERAL ELECTRIC

New York, Saturday, November 1, 1924

# Electric Railway Journal

*Consolidation of Street Railway Journal and Electric Railway Review*

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

*Volume 64*
*Number 18*

## Are We Determining Street Railway Wages in the Right Way?

TWO serious questions are raised by the increases in wages since the first of the year on a number of electric railways as the result of wage arbitrations. First, what is the industry going to do if wages continue to go up, or even if they remain at their present level? Second, is the right method being used generally now to determine the rate of wages to be paid?

As to the fact that wages on electric railways are very high at present, there can be no question. Albert S. Richey's index figure for October, 1924, published in this paper last week, was 221.9. This is larger than at any time during the war, and in the history of the industry it has been exceeded only for thirteen months in 1920 and 1921, at a time beginning at the peak of all the other common index figures.

Another disquieting fact about the present wage index figure is that during the last year and a half it has constantly been going up. Thus in April, 1923, it was 207.3. During the next six months it gradually went to 217.5. In January of this year it was 218.9 and in February it was 219. By June it had reached 220.4. In July, August and September it was 221.4 and October showed the figure of 221.9, already mentioned. The figures quoted are weighted, according to the method Mr. Richey has been following, on the basis of passenger cars operated by the different companies.

Obviously, if railway companies could increase their receipts in the same proportion as wages go up, their balance would still be on the right side of the ledger, but it is not always easy legally to raise fares nor always advisable economically to do so. Boston, it is true, has raised its local suburban fare from 5 cents to 6 cents due to its recent wage increase, but the effect on traffic is yet to be determined.

The second question likely to be raised in connection with recent wage increases—and closely connected with it—is whether the right method is being used generally by arbitration boards to determine the rate of wages. As a rule, in such proceedings held recently, the decision on whether wages will go up or down involves the question of whether there has been an increase or decrease in living costs, as shown by the various index figures and testimony on local conditions.

There are three manifest objections to the use of changes in the cost of living as the basis for a change in wages. The first of these is that the fairness of a wage schedule so determined must depend entirely upon the fairness of the one previously used. The second is the difficulty of determining the exact percentage of change in cost of living from the testimony usually presented. The third objection is that the extent to which it is used requires a corresponding disregard of the old measure of "supply and demand."

One advantage of the "supply and demand" method of determining wages is that generally it is capable of only one interpretation. Where the turnover is large, the wages are probably too low. If the turnover is very low, the wages may be unnecessarily high. Many electric railways have recently enjoyed a very low labor turnover. By itself this is a very desirable condition, but it is also evidence that employment conditions must be very satisfactory as compared with those, including wages, existing in other industries. In such circumstances, the question naturally arises: Is an increase in wages economically justified if those paid at present are enough to attract and retain competent employees?

## Twenty Years of Transit Development

THE dinner given this week celebrating the twentieth anniversary of the opening of the first of New York City's subway lines, at which Frank Hedley, president and general manager of the company, was guest of honor, marked in a fitting way this milestone in the progress of metropolitan transit. The need for better facilities had been felt for a long time. The original elevated railways had been built some 30 years earlier, and operated first with steam and much later with electricity. Surface cars were installed on all the principal streets of the city, and were working to the limit of their capacity. Even subways had been projected years before, the first one having been proposed as early as 1868 and others following from time to time. Subway building, however, costs more money than the early planners could command. It took the courage and tenacity of August Belmont and his associates to finance the project, which in those days was an enormous undertaking for private capital.

At the time the subway was begun it was difficult to see the profound effect that event would have on the future development of the city, for the new line was looked on only as a supplement to the existing system of elevated lines which had been developed for many years. It was built in preference to an elevated largely on account of a civic pride that barred all overhead obstructions from the better streets of Manhattan, and incidentally to save damage claims from property owners. But on account of removing these objections it was possible for the new line, unlike the elevated roads that had been built earlier, to make its path through the heart of Manhattan, and as an extension on an elevated structure, well out into the Bronx. Soon it was extended to the center of Brooklyn through tunnels under the East River, doing away with the ferries and the transfer at the Park Row terminus of Brooklyn Bridge. Then, too, it gave a type of high-speed express service never thought possible on a purely urban railroad.

This original subway was but the beginning of a network that has been made to cover four of the five

boroughs of the greater city and weld them into a homogeneous city, far greater than that dreamed of before rapid transit was a reality. While before the transportation systems were the child of the city, the city became the child of the transportation system. The entire face of the metropolis was transformed. Manhattan, once complete in itself, became the workshop of the greater city, and the farms and pastures of the old days became the residence districts. Instead of the promoters having to beg the city for permission to build, the city is now in the position of being the subway promoter, as it has been realized that only by rapid transit can the city prosper.

But a subway once built must be operated, and to be successful financially it must carry more people and at less cost than any other form of transportation. As one of the speakers at the dinner humorously remarked, it took a genius to pack 'em in for twenty years in the rush hours in such a way that the people still demanded more subways. That is the accomplishment of Mr. Hedley, who has managed the property during the entire 20 years of its existence, as well as the network of elevated lines of the Interborough system. One of the speakers remarked that his job is the hardest railroad job in the world. Under his direction the road has not only been operated as planned, but stations have been enlarged, trains have been lengthened, signals have permitted much closer headways, and automatic devices on the cars have permitted higher train speeds with a material reduction in the platform labor needed, so that the original subway is now carrying about four times as many passengers as it was designed for. With all this rush and bustle, the service continues day after day with scarcely an interruption. And "The New York subways always have returned to every customer more than full value for every nickel received." Surely this is an accomplishment of which any man can be proud, as the speakers at the dinner pointed out in paying tribute to the leadership of Mr. Hedley.

## Making Anti-Friction Bearings Win

IT IS to be hoped that something more than a quizzical raising of the eyebrows will greet the account of progress with anti-friction bearings on some thirty-seven continental properties, as presented to the Internationaler Strassenbahn und Kleinbahn Verein in a paper by Karl Pforte, manager of the Hagen Street Railways. This report, abstracted elsewhere in this issue, is a strong reinforcement of a like statement on Franco-Belgian street railways by Ch. Harmel, manager of the East-West Tramways of Liége, which was abstracted in the issue of Aug. 30, 1924.

On the mere face of American experiences with anti-friction bearings, a certain degree of doubt as to their value would be justified. Operators in this country have tried, discarded and tried again both the ball and roller bearing in motors and for car journals. Most of the unfortunate experiences, also, have been with the journal bearings rather than those in the motors.

Manufacturers of anti-friction bearings no doubt began to use them on electric car equipments without a full realization of the hard service to which they would be subjected. But going deeper than a superficial summary it will be found that the manufacturers have been far less at fault than the assemblers and maintainers of car equipment, as well as those responsible for standards of track upkeep. One case comes to mind where it was absolutely impossible to run a batch of cars fresh from the builder because the ball-bearing journal boxes had been wrongly installed. Again, more than one failure of anti-friction bearings has been traced back to the shops where a graduate of the village smithy rather than a precision mechanic had the responsibility for results. In many cases, also, it was forgotten that a street car bearing has no rubber tires to absorb shocks that are ruinous to the anti-friction types.

If so many European properties can show good results from the use of anti-friction bearings, there must be several good reasons aside from matters of design and quality of material. Two reasons, undoubtedly, are the employment of better-skilled labor and the insistence upon smoother track. Certainly there is no reason why Americans cannot obtain results as good as those across the Atlantic.

## Tell the Men the Real Meaning of Transportation

IN THE broiling heat of a summer afternoon, a railway shopman is engaged in the tiresome job of cleaning and inspecting the equipment of a snow sweeper. Such a task on such a day seems a cruel mockery. Who can blame the man for performing his work half-heartedly? Yet, because he is a real railway man, he does it with the same care and attention that the painter uses when decorating the exterior of a car.

Railway operation at times is full of interest, excitement—and sometimes of danger. The work of the moment may be to clear a blockade quickly, or to reroute cars in case of a fire so that passengers will not be delayed. It may be to pick up a fallen live wire or to keep the lines open during a terrific storm. Transportation means providing service as safe, as speedy, and as comfortable as may be possible—in the face of whatever obstacles nature or man may place in the way.

But transportation has another and less romantic side. It means keeping everlastingly after small details. It means inspecting brakes, tightening nuts, testing signals or walking the track in a dark subway. The excitement that sustains the men engaged in the actual operation of cars is lacking to those in the mechanical, electrical, or track departments.

There is nevertheless a certain satisfaction in knowing that the lives of the passengers may depend quite as much on the thoroughness of the man working unseen in the pits as on the care exercised by the man at the controller. Old railway men realize this. They know that responsibility for carrying the public safety rests equally on the men in every department and that the real reward in the transportation industry is not the wage paid but the consciousness of service rendered. Money alone would hardly induce a mechanic to work for hours in the heat of summer to put equipment in shape for the winter. Only the knowledge that it was part of the game would make him do a good job.

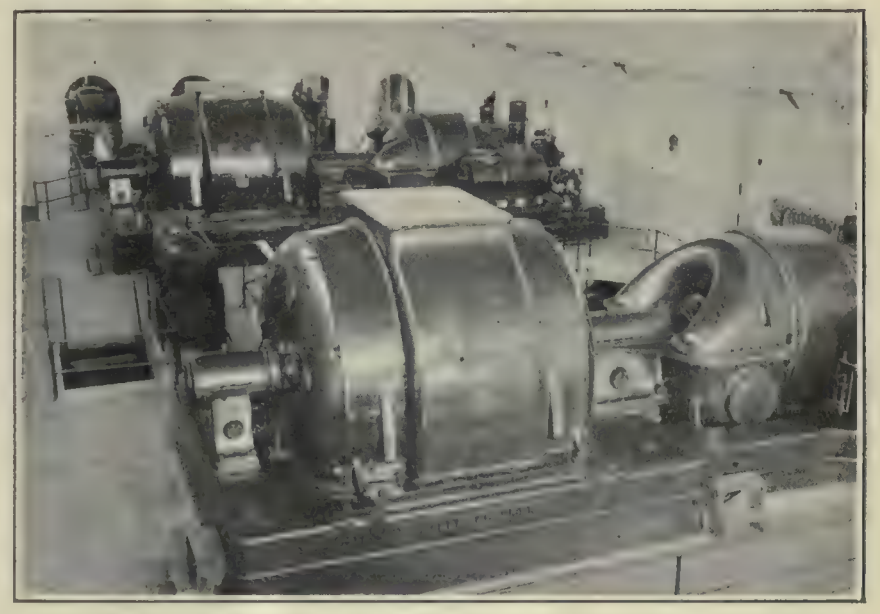
But new blood must be brought into the industry if it is to survive and progress. The new men taken into railway organizations every year do not always understand and share the point of view of the experienced transportation man. Yet nothing is more important than that every workman should be an enthusiast about his own business. No pains should be spared, therefore, in imbuing the new men with the spirit of transportation that has always made it one of the favored vocations of men with ability and vision.

# Denver Tramway Modernizing the Power Plant

**Faced with an Urgent Need for Increased Power Supply, and Unable to Buy Additional Power Advantageously, the Denver Tramway Has Increased the Capacity of Its Platte Street Plant So as to Meet All of Its Needs for a Number of Years**

RECENTLY completed changes and additions to the Platte Street power plant of the Denver Tramway represent the final solution of a serious and perplexing power supply problem that faced this company in 1922. At that time the economical generating capacity of the railway plant, together with approximately 15 per cent of purchased power, was insufficient for its needs. In addition, there was no reserve capacity to take care of the existing demand in the event of a shutdown of the principal turbine unit, and available facilities of power companies in the district offered no advantageous relief.

With this situation confronting it, the management made a careful analysis of the existing conditions and also of the probable future requirements for power. Finally, through a fortunate purchase of surplus generating equipment from the government, the railway company has been able to modernize its plant thoroughly and also to provide on an economical basis reserve capacity for the future.



**Interior View of New Section of the Turbine Room Shows the Two Units Recently Installed. The Entire Cost of the Plant and Buildings Is Now Less than $63 per Kilowatt of Capacity**

## Low Investment and Operating Cost

The cost of the completed plant as now operated is less than $63 per kilowatt of capacity. This includes not only the cost of new equipment and installation labor in that part of the plant which is now operated, but also includes all real estate and buildings (a good portion of which is taken up by a building that houses old reciprocating equipment which will ultimately be disposed of). It also includes the total cost of six 750-hp. capacity Stirling boilers and the cost of a considerably larger boiler room than is actually required for the equipment which is now being used. This boiler room gives available space for future expansion of boiler capacity.

For a comparatively small station, the total costs of generated power are also maintained at a low figure. On page 760 a table gives a consecutive record of the cost of power to this company for a period extending back to 1910. In analyzing these figures it must be borne in mind that this is practically all railway load, which has an inherently poor load factor, and that the increased use of private automobiles has resulted in making this condition worse than was formerly the case.

## Old Plant Lacked Capacity

An approximate idea of the situation confronting the company in 1922 may be obtained from an examination of the conditions existing before the plant was reconstructed. At that time the power was supplied by the equipment listed below.

In addition to the generated energy, the tramway company purchased approximately 15 per cent of its requirements in the form of hydro-electric power from the Colorado Power Company.

Combining the capacity of the plant and the purchased power gave a total of 19,575 kw. available. With No. 8 turbine shut down this capacity was reduced to

| | | |
|---|---|---|
| Platte Street Power Station | | |
| Nos. 1 and 2 | Two 800-kw. d.c. generators, engine driven | 1,600 kw. |
| No. 4 | One 1,600-kw. d.c. generator, engine driven | 1,600 kw. |
| No. 5 | One 1,500-kw. a.c. generator, engine driven | 1,500 kw. at unity p.f. |
| Nos. 6 and 7 | Two 2,000-kva. a.c. generators, turbo driven | 4,000 kw. at unity p.f. |
| No. 8 | One 7,500-kw. a.c. generator, turbo driven | 9,375 kw. at unity p.f. |
| Total generating capacity | | 18,075 kw. at unity p.f. |
| Delaware Substation | | |
| 60-cycle purchased power | | |
| Rotary | One 1,500-kw. rotary converter | 1,500 kw. |
| Total capacity of all sources of power | | 19,575 kw. |

10,200 kw. The hourly peak load averaged 11,500 kw., so that with the No. 8 turbine out of commission, the maximum hourly peaks of 13,500 kw. could not be taken care of. Swing peaks were running up to approximately 16,000 kw. Because of the high water rates of the two small turbines and the reciprocating units the boiler capacity was only sufficient for about 10,125 kw. with No. 8 turbine shut down.

From the foregoing, it is apparent that if No. 8 turbine was shut down the old generating equipment would not be able to take care of the demand except under excessive overloadings. Its age and physical condition was such that this was taking unwarranted chances. No. 8 turbine was five years old and getting to a point where overhauling periods were becoming longer each year.

For years the average kilowatt demand of the system changed very little, but the maximum demand during rush hours has steadily increased. This is due to the increased rush-hour business of the company and the effect the automobile has had in holding down the off-peak load.

The capacity of generating equipment is determined by the maximum demand and the economy of the plant, and the proper size of generating units is fixed by the load factor. To determine just what was needed in the way of additional capacity, load factor curves were prepared, which took into consideration past loads, rate of increase in population, increased use of passenger automobiles, capacity of business district to accommodate parked automobiles, size of motors necessary under rolling stock, car speeds, number of cars required, etc. A period of 15 years was covered.

### THREE PLANS OF PROCEDURE CONSIDERED

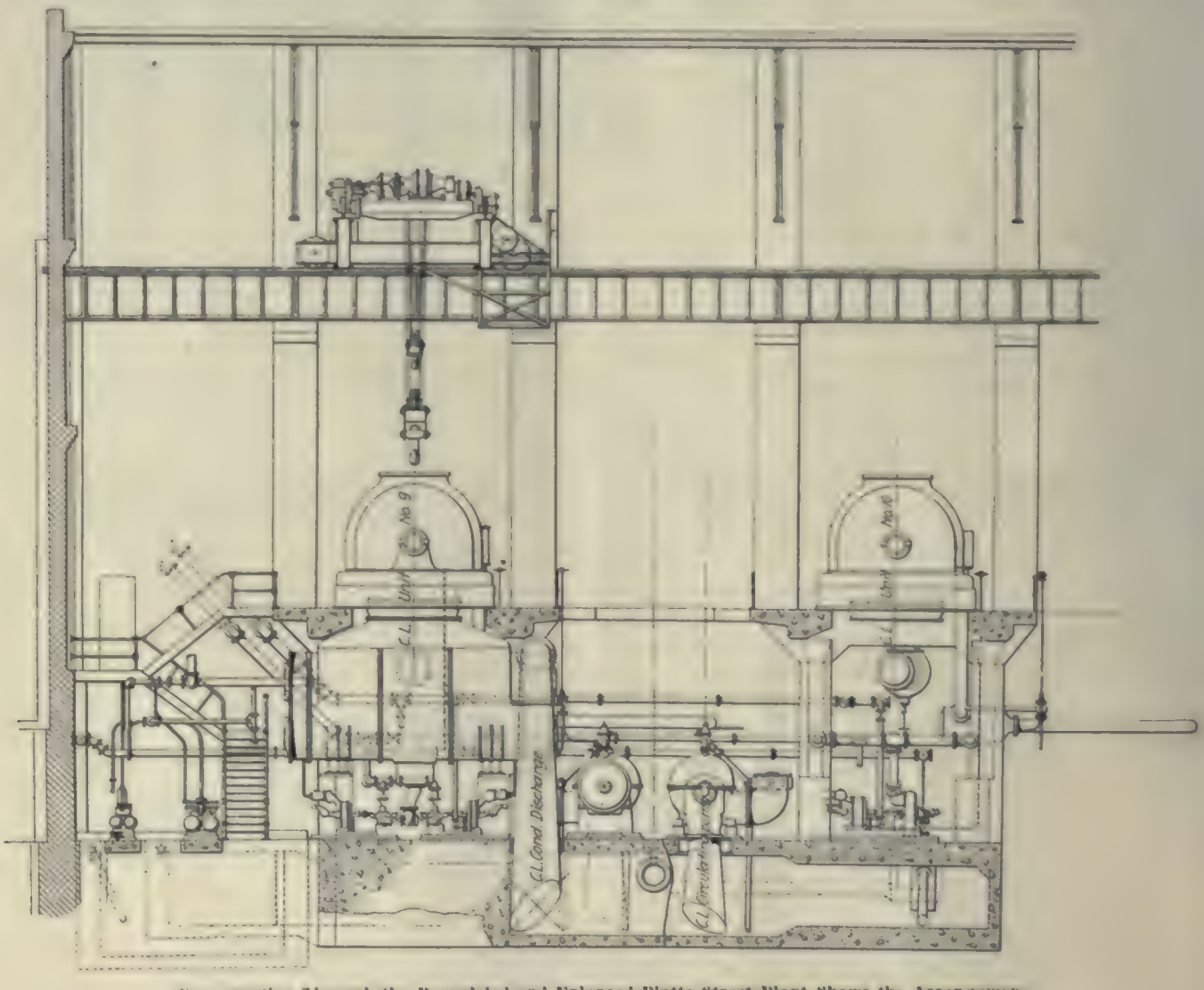
In view of the above situation it was necessary either to install more generating equipment or enter into contract for additional purchased energy. Three possible plans of procedure were considered.

1. To purchase all of the energy required by the company.

2. To generate all of the energy required by the company.

3. A combination of generation and purchase.

These plans were studied carefully. The "all purchase" plan was found impossible. There were two power companies in the field. The first did not have sufficient capacity to take care of the entire railway requirements, and even with sufficient capacity available, the rate was not attractive to the company. This situation was further complicated by the fact that the power would be delivered over long-distance transmission lines, making it necessary to have sufficient steam standby available to take care of interruptions. Steam




Cross-Section Through the Remodeled and Enlarged Platte Street Plant Shows the Arrangement of Turbines, Foundations and Auxiliaries

standby in sufficient amount to guarantee continuity of service meant fixed charges to be added to the power company's charges.

A second power company in the field was not in a position to furnish the railway with power and suggested that it wait until a project the power company was working on had been completed. However, the time was too far in the future and the company was faced with the danger of a breakdown at any time. The rate offered, compared with the railway's own generating costs, also put this plan out of the question.

Another important reason why the company could not consider the purchase of all of the energy required by it was that its substations were all 25-cycle and the power companies were proposing to furnish 60-cycle energy. The conversion losses would be high, or if the company was required to sell the 25-cycle equipment and install 60-cycle apparatus, an expense of $600,000 would have been incurred with very little opportunity for recovering any part of this expense through the sale of the 25-cycle equipment.

The third proposition was a combination of purchase and generation, and this was rejected for some of the reasons outlined in the preceding paragraph, and also because the power company could not supply energy at a cost low enough to be attractive.

### All Generation Plan Adopted

The second proposition of "all generation" was finally adopted. With the fact established that it was impossible to work out a satisfactory purchase scheme, either for all or part of its power, there was only one proposition left for the tramway company and that was to increase the generating capacity. The contract with the hydro-electric plant was expiring and could not be renewed on the old basis, so inquiries were made for one additional turbine unit of 10,000 kw. or larger capacity, which with No. 8 would have given approximately 20,000 kw. modern generating capacity. Proposals were solicited from the various manufacturers, estimates prepared and plans started for the addition of one new unit. There was sufficient building capacity to house this unit and sufficient boiler capacity available to supply the necessary steam requirements.

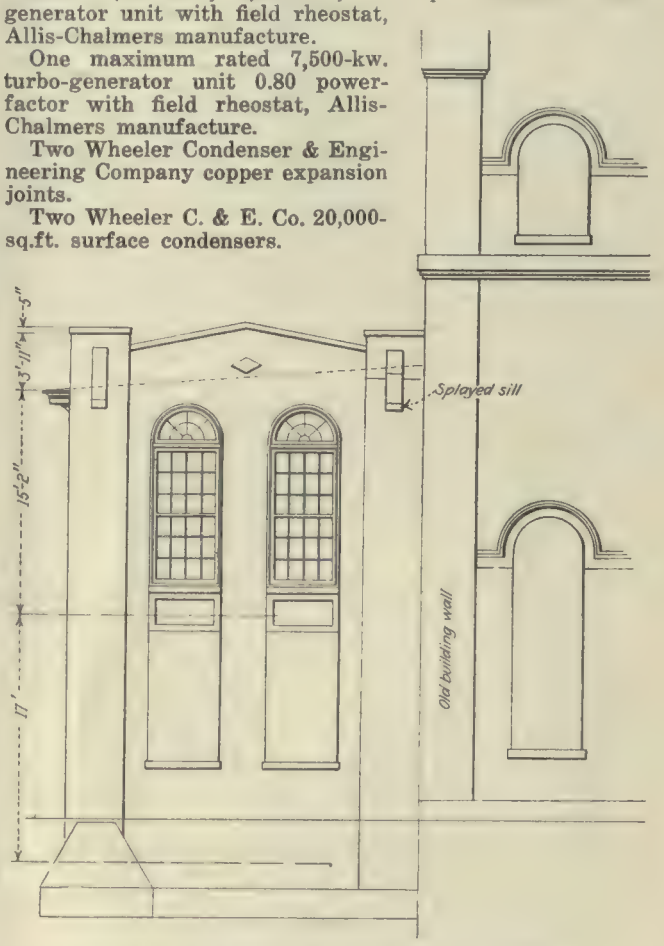
While securing bids the company's attention was directed to an advertisement by the government offering for sale generating equipment at one of the arsenals. The specifications of this equipment were identical with those covered in the specifications for the proposed additional capacity. Negotiations were started and resulted in the purchase of this equipment, which included the following:

One 10,000-kva., 8,000-kw., 0.80 power-factor turbo-generator unit with field rheostat, Allis-Chalmers manufacture.

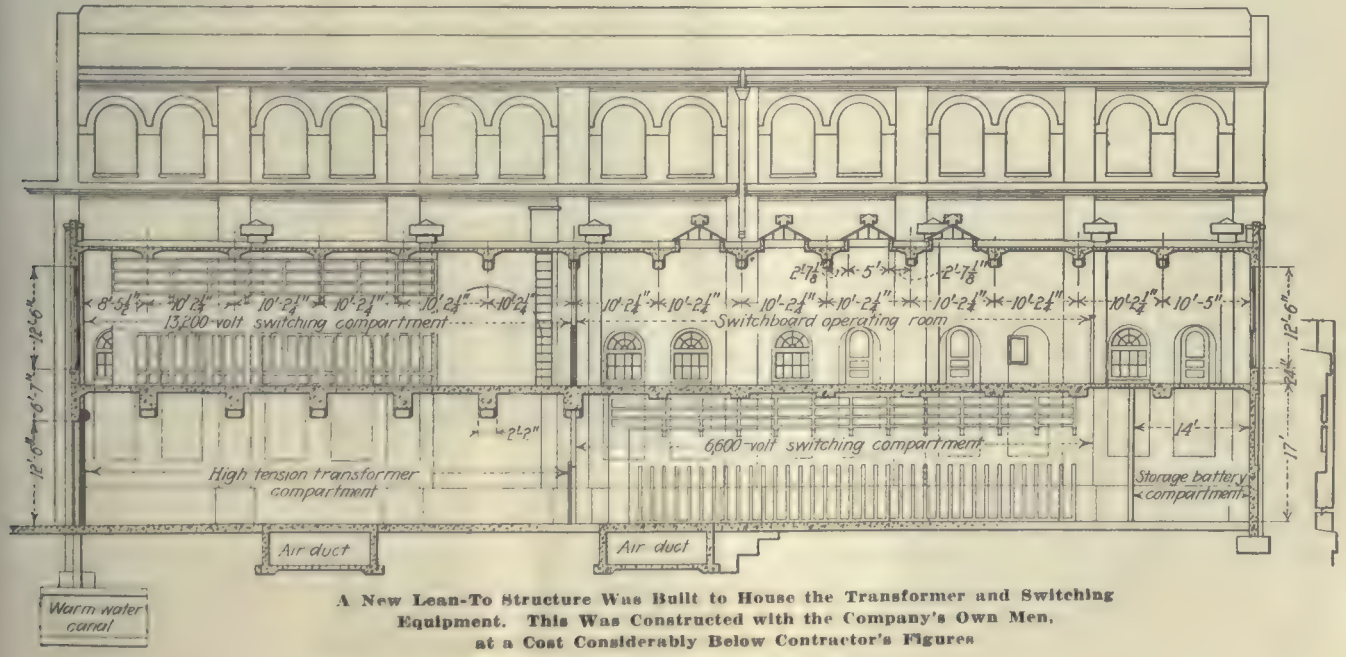
One maximum rated 7,500-kw. turbo-generator unit 0.80 power-factor with field rheostat, Allis-Chalmers manufacture.

Two Wheeler Condenser & Engineering Company copper expansion joints.

Two Wheeler C. & E. Co. 20,000-sq.ft. surface condensers.




End View of Addition Housing the Transformer and Switching Equipment




A New Lean-To Structure Was Built to House the Transformer and Switching Equipment. This Was Constructed with the Company's Own Men, at a Cost Considerably Below Contractor's Figures

ENERGY COST ON DENVER TRAMWAY, 1910-1924

| Year | 1910 | 1911 | 1912 | 1913 | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 | 1922 | 1923* | 1924† |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Energy generated and purchased, cost per kilowatt-hours (cents) | 0.81 | 0.89 | 0.82 | 0.88 | 0.92 | 0.87 | 0.77 | 0.70 | 0.72 | 0.80 | 0.84 | 0.88 | 0.79 | 0.74 | 0.68 |
| Pounds of coal per kilowatt-hour | 4.97 | 5.03 | 4.91 | 4.89 | 4.90 | 4.48 | 4.19 | 3.94 | 2.51 | 2.46 | 2.57 | 2.55 | 2.55 | 2.47 | 2.53‡ |

*First new unit tried out November, 1923
Both new units in service and old machines shut down—Nos. 8, 9, 10 in regular service and No. 4 as standby.
†Colorado lignite slack, average about 9,000 B.t.u.
‡Four months

Four Wheeler C. & E. Co. hot well pumps direct connected to G.E. turbines.

Two Wheeler C. & E. Co. centrifugal air pumps direct connected to G.E. turbine.

Two Wheeler C. & E. Co. 24,000-gal. per minute circulating pumps direct connected to Allis-Chalmers motor with compensator.

Three "Rex" revolving intake screens, with motor drives.

Two Crane Company steam separators.

One General Electric Company 100-kw. exciter with field rheostat direct connected to G.E. turbine.

One G.E. 120-kw. exciter with field rheostat, direct connected to G.E. motor with compensator.

One "Northern" 50-ton electric traveling crane with 10-ton auxiliary hoist.

Three 750-kva., three-phase, 25-cycle, 6930/13860Y/480Y, G.E. transformers.

One Laidlaw-Dunn-Gordon 600-cu.ft. air compressor belt driven by G.E. motor with compensator.

One Allis-Chalmers 400-gal. per minute centrifugal boiler feed pump direct connected to Allis-Chalmers turbine.

One Allis-Chalmers 300-gal. per minute centrifugal service pump, direct connected to Allis-Chalmers turbine.

Two American Spray Company 25,000-cu.ft. per minute air washers with motors.

This equipment was new; some of it had never been uncrated; one of the units had been partially set up and the other was on the floor just as taken off the cars. It developed that these two units, having a total capacity under the conditions obtaining in railway operation of nearly 20,000 kw., which had never been used, could be purchased at a reasonable price. It was impossible to negotiate with the government for the purchase of one machine, so therefore, inasmuch as they and their auxiliaries were so well suited to the needs of the Denver Tramway, both units were purchased and installed. The net result is that this power plant is thoroughly modernized and has sufficient capacity to produce power economically for years to come. From a study of the load forecast it was apparent that a single 10,000-kw. machine would have given sufficient capacity only until 1926.

### Installation of New Equipment Has Given Railway Adequate Capacity

The two units purchased from the government are known as Nos. 9 and 10. They are located in the power house in the same position as No. 8, set on reinforced concrete foundations, column design. The condensers are at right angles but directly underneath the discharge end of the turbine, close connected. These condensers are Wheeler C. & E. Co. 20,000 sq.ft. capacity ultimate, now equipped with 12,500 sq.ft. of tubes. They are served with Wheeler C. & E. Co. hot water pumps connected to G.E. turbines and Wheeler C. & E. Co. centrifugal air pumps connected to G.E. turbines. There are two hot well pumps for each condenser. Each condenser also has a Wheeler C. & E. Co. circulating pump direct connected to an Allis-Chalmers motor. Allis-Chalmers service pumps of 300 and 400 gal. per minute are installed. The air intakes to the generator are protected with an American Spray Company 25,000-cu.ft. per minute air washer, motor operated.

The high-tension switches for this station had been located in a building that had long since become overcrowded, and it was necessary to build a new structure to house this equipment. This new switch house is of concrete lean-to construction, two floors, housing the high-tension transformers, 13,000-volt concrete bus-cell structure and the 6,600-volt concrete bus-cell compartments; also the generator feeders and the auxiliary switchboards, which in the old arrangement were located in the lower part of the old engine room. The transformers, oil switches and bus construction are of modern design.

All of the foregoing work was undertaken and consummated by operating forces of the tramway company with the exception of one Allis-Chalmers superintendent of erection and the construction costs were appreciably lower than those estimated in the bids which were submitted by contractors.

The new equipment was installed with no interruption of service. The turbines were erected, tested out and placed in operation in conjunction with the old equipment. At no time was it necessary to shut down the plant on account of this construction work. The changeover from the old switch house to the new was carried on under operation.

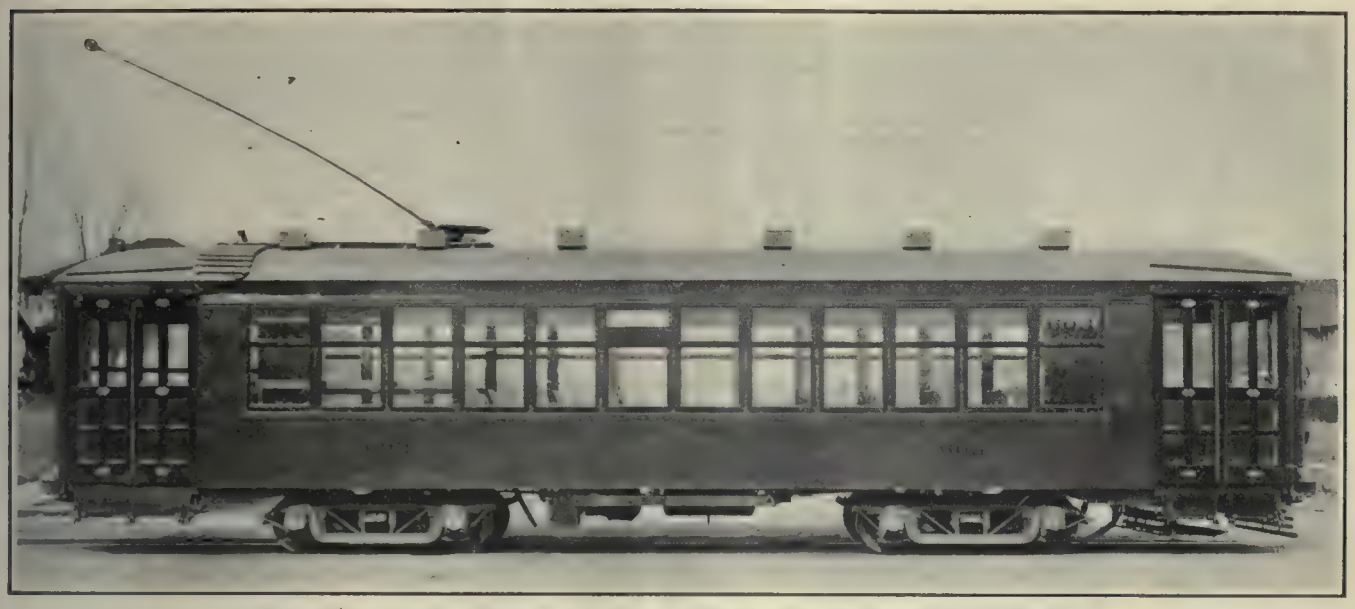
## Painting to Widen the Car

AN UNUSUAL camouflage scheme is being tried on the dash painting of a number of the cars of the Schenectady Railway. The design shown in the accompanying illustration is worked out to give the appearance of greater width than actually exists. By an optical illusion the car at a casual glance appears to be several inches wider than it actually is and the object of this is to deceive automobilists and truck drivers into giving the car a little more room than they ordinarily would. It is being tried out by Niles Persons, master mechanic of the railway. It is believed that it will reduce accidents of the side-wiping type between street cars and other vehicles on the street.




How Schenectady Cars Are Camouflaged to Give Appearance of Greater Width

Another peculiar painting design was tried on the new cars of the Brooklyn City Railroad, but in this case it was for the purpose of attracting attention to the new cars as a means of inviting traffic and informing passengers that it was one of the new front-entrance, center-exit type cars.



These Low-Floor Cars Have Proved Popular with the Riding Public in Des Moines

# Medium-Weight Low-Floor Cars in Des Moines

## New Cars Have Proved Popular with Passengers—Single-End Construction Gives Seating Capacity of 48 and Total Weight of 38,000 Lb.

TEN new cars of moderate weight and pleasing appearance, which were put in service in Des Moines early in the summer, have proved very popular with the riding public. These cars are arranged for single-end operation and are equipped with four G.E. No. 247 motors and K-35 control. They are of the straight side girder type of construction with arch roof and folding doors and steps at front and rear. The platform floors are carried flush with the car body floor, and a 3½-in. ramp from the bolsters to the end sills serves to reduce the height of steps.

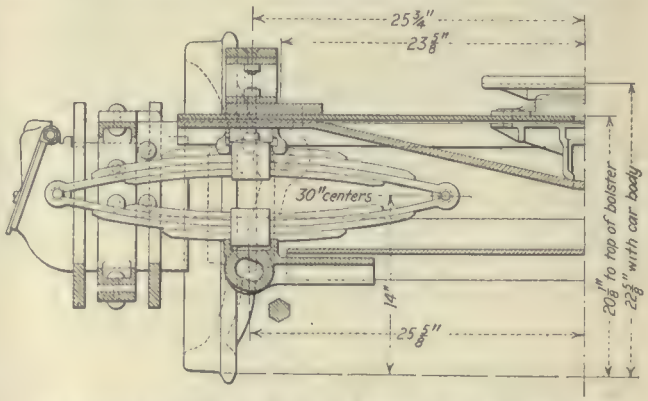
Side posts are spaced on 2-ft. 5¼-in. centers, and with an over-all length of 46 ft. a seating capacity for 48 passengers is obtained. By carrying the inside lining close to the girder plate the cross-seat width is made 35 in. and the aisle is 25⅝ in. between the seat aisle plates. The seat backs are offset at the aisle end so that the distance between the edges of the backs across the aisle is 29⅜ in.

Cherry is used for the interior trim. The headlinings are painted cream color and all interior rails and stanchions are of aluminum.

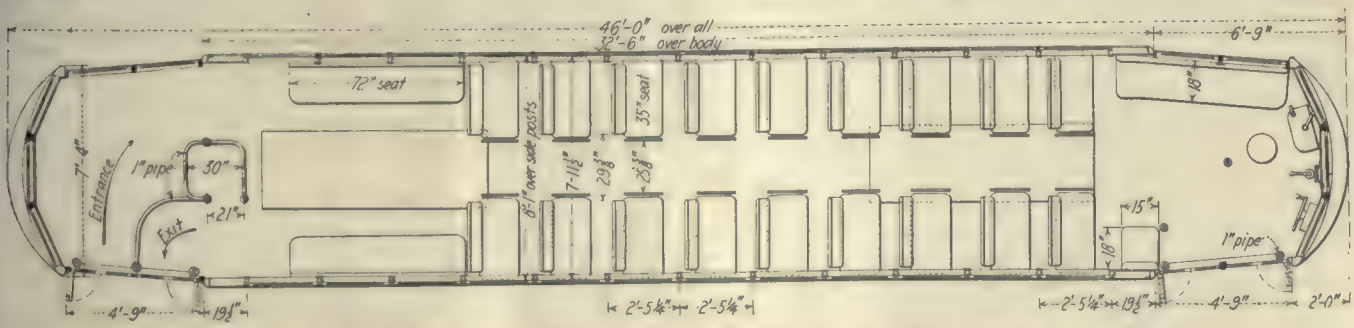
The principal dimensions and distribution of weight are as follows:

| | |
|---|---|
| Length over all | 46 ft. |
| Width over all | 8 ft. 2 in. |
| Bolster centers | 20 ft. 6 in. |
| Side post centers | 2 ft. 5¼ in. |
| Width over side posts | 8 ft. 1 in. |
| Height over trolley board | 10 ft. 11 9/16 in. |
| Height from rail over car floor | 33½ in. |
| Height from rail to bottom of side girder | 26 13/16 in. |
| Height from rail to platform floor | 30 in. |
| Height from rail to step | 15⅝ in. |
| Height from step to platform floor | 14⅜ in. |
| Wheel diameter | 26 in. |
| Wheelbase of truck | 5 ft. 6 in. |
| Weight of car body complete | 20,000 lb. |
| Weight of truck with four GE-247 40-hp. motors | 10,000 lb. |
| Weight of equipment | 8,000 lb. |
| Total weight completely equipped | 38,000 lb. |

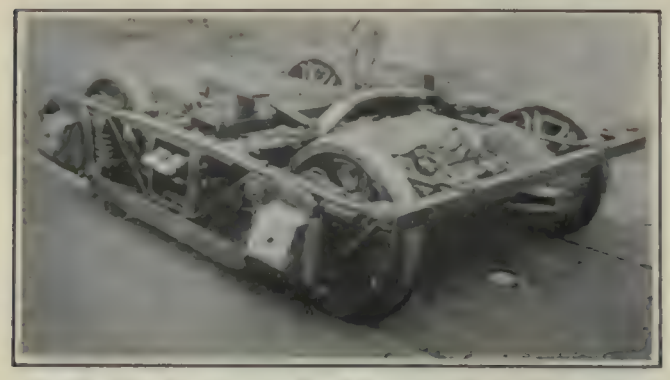
The cars were built by the McGuire-Cummings Manufacturing Company, and are mounted on McGuire-Cummings type MC-62 low-level trucks. These trucks are




The Arched Brake Beam on the Special Type of Low-Level McGuire-Cummings Truck Has Two Long Shoes that Ride on Longitudinal Straps and Keep the Beam from Tilting




Single-End Construction Gives a Seating Capacity of 48—Folding Doors Are Pneumatically Operated



Low Car Level and Ample Road Clearance Are the Objectives in the Truck Design

of the equalizer type and are specially designed to give the low level and at the same time maintain a minimum clearance of 4 in. above the rail. The brake rigging is arranged with an arch brake beam having a long forged sliding shoe at each end which rides on top of longitudinal members extending from the transom to the end frame, and which are designed to keep the brake beam from tilting. The double-length brake hangers are provided with a spring on the top to prevent chattering. Compensating-type full elliptic bolster springs are arranged to provide for variation in the live load.

All wearing parts of the trucks are case hardened, including pins and bushings. Pedestals are made of forged steel, machine finished. A cast-steel yoke connects the 2½-in. x 7-in. flat-bar transom to the side frame, and heavy gussets are provided to reinforce the corners and support the brake rigging. The bolster is of built-up construction, composed of channels and plates. Journals are 3¼ in. x 7 in.

Four GE-247 40-hp. motors provide the motive power for these cars and the control is type K-35-JJ. The detailed specifications and list of equipment are as follows:

| | |
|---|---|
| Compressor ..... GE CP-27 | Trolley base ..... US-13E |
| Seats ..... Heywood-Wakefield upholstered rattan | Door equipment, National Pneumatic Co |
| Heaters, Consolidated Car Heating Co | Headlight ..... Golden Glow |
| Thermostats, Railway Utility Co. | Sand trap, Des Moines standard |
| Ventilators, Railway Utility Co. | Outside paint, Pratt & Lambert Vitrolite |
| Curtain fixtures ..... Ring No. 88 | Axle ..... Standard Steel Works |
| Curtains, Double-face pantasote | Wheels ..... Illinois Steel 26-in. rolled steel |
| Hand brake ..... Peacock | Lifeguards ..... H-B |
| Headlining ..... Agasote | Register ..... International R-5 |
| Control ..... GE K-35-JJ | |

## Saving by Radio Announcing

AN INTERVIEW in the Detroit *News* with H. M. Gould, assistant general manager of the Department of Street Railways, Detroit, gives the savings up to date from the use of radio for summoning repair crews. An account of the method followed in this matter was published in the ELECTRIC RAILWAY JOURNAL for July 12.

During May, June, July and August of this year, 113 radio calls went to the emergency trucks, whose crews were able to spend 3,655 hours at routine work, when, without the radio, they would have remained idle. The saving to the Department of Street Railways is estimated at $14,109.19 for the four months. The cost of operating and maintaining the receiving sets and the salary of the additional radio operator required is placed at $907.19, making a net saving to the city of $13,202.11.

The broadcasting at present is done only between 11 a.m. and 3 a.m., except on Sundays and holidays. Later, it is expected that the system will be in force 24 hours a day. It is also planned to equip with radio the six construction trucks now in use by the department, one fire truck, and the track department's two emergency trucks. In addition to its use by the Department of Street Railways, the broadcasting station is used to call the "cruisers" and "flyers" of the Detroit police department. In fact, the station was installed primarily for this service, and the use for the street railways came later. The police cruising cars are equipped with portable receiving sets and have no difficulty in receiving messages while they are running at a high rate of speed.

## Auto Truck Sands Track in Utica

BECAUSE track is sanded ordinarily only on the grades in Utica, the New York State Railways has found a small Ford auto truck to be superior in that city to a trolley sand car for this work. It is stated that much time is saved by its ability to cut across from one street to another and that it is cheaper to operate than a railway car. A 4-ft. piece of air hose extends from a hole in the bottom of the truck down to the rail. The position of the free end is controlled by a light steel rod manipulated by a man who sits on the back of the truck, as shown in an accompanying illustration.



Track in Utica Is Sanded by Means of This Small Auto Truck

The flow of sand is stopped simply by pulling up the end of the hose.

In winter this truck is also used to carry around men who salt the track switches. Two men on the truck take the place of about 12 men who formerly were required for this work. During the construction season the truck is used also to deliver materials for small maintenance jobs.

# Careful Engagement Reduces Turnover

**The Method of Engaging Trainmen on the System of the United Railways of St. Louis Has Secured an Excellent Selection and the Turnover Has Become Negligible—The Forms Used in Employing and Training Men Show the Care Used**

THE success of a method is proved by its disuse. This may seem a contradictory statement, but it is true when applied to the employment methods of the United Railways of St. Louis. The plan followed in engaging men is the result of extended experience and has brought into the service such a group of satisfied and satisfactory employees that the turnover has become very low. In fact, the report of the employment department on July 1, 1924, that no new platform men had been hired since the corresponding report of May 1, and that no new men would probably be required until the end of August, shows a notably satisfactory condition of affairs. It should be said that the number of motormen and conductors on the company's payroll on May 1, 1924, was 3,748, which is a large number to keep practically intact in these days of business activity.

Of course, a large factor in this low turnover is the fact that excellent relations exist between management and men, and this keeps down both resignations and discharges, but an equally large factor in the situation is the care taken in the selection of the men in the first place. Every effort is made to discover the unfit man before he is engaged. This is of benefit to both company and man. Where care is taken to select men qualified for the work, the most frequent cause for turnover disappears.

Applicants for employment are first interviewed by Joseph D. Crafton, who has long held the position of employment superintendent of the company and has the faculty of being able to judge very accurately from the manner in which a new man talks and carries himself whether he has the makings in him of a good and steady trainman. Mr. Crafton's practice, when a man applies for a job on the road, is to let him do most of word and listening to him with a great deal of sympathy.

### Preliminary Application Blanks

This interview being satisfactory, the new man is asked to make out the preliminary application blank, shown in the first form. If the answers to the questions on this blank meet the requirements, the applicant goes to the company's medical director to receive a physical examination. This calls for a test of the sight and color perception of right and left eye and the hearing of each ear by watch and voice, as well as the condition of lungs, heart, spine, etc. The applicant is also asked as to the extent of his use of alcoholic beverages and tobacco. The blank carries front and back diagrams of the human form upon which any peculiar characteristics or marks of the applicant can be indicated by the examiner. This blank is signed by both the applicant and the medical director, and then it is returned to the superintendent of employment.

If the applicant has passed successfully all tests up to this point, he receives a printed copy of the specifications for uniform, and also a more extended form of application blank, on which he enters his full name, date and place of birth, physical characteristics, address, length of time a resident of St. Louis, number of dependent relatives, previous occupation, and name of previous employers. A statement on this blank warns the applicant that $50 in cash will be needed by him for the purchase of his uniform and for living expenses before he begins to earn any wages. The employment blank also carries the following printed agreement, with place for affidavit by a notary public.

*In consideration* of being permitted to make application for employment by Rolla Wells, receiver of the United Railways Company, I hereby agree with Rolla Wells, receiver of the United Railways Company (hereinafter called "employer")

To deposit with said employer the sum of $5 as a surety fund for the faithful performance of my duty.

To work under instruction on and during trial period, without pay, for such time as said employer may deem necessary.

That if I am discharged, or leave said employer's service voluntarily at any time during or after said trial period, I shall have no claim against said employer for services rendered or expenses incurred by me during said trial period.

That wages are to be paid only for such time as I am engaged in operating or running a car for said employer, or in actually doing such other work as may be assigned by said employer computed at the current rates shown on the employer's printed schedules or bulletins.

That these wages are satisfactory to me, and, if I am employed by the said employer, to work contentedly and faithfully.

That I will make no charge, claim or demand against said employer for the time spent in reporting for duty at the request of said employer or any foreman or agent thereof, or waiting after so reporting before actually beginning work.

I hereby warrant the truthfulness of the above statements, and certify that I can read and write the English language and that I personally filled out this application, and enter into the following:

[Read every word of this carefully as you will be held to a faithful performance of the conditions set forth.]

#### Further Agreement

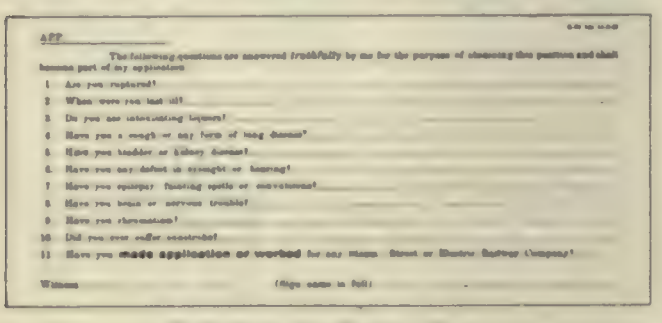
In case I am employed by Rolla Wells, receiver of the United Railways Company of St. Louis, as a motorman I ..... hereby agree that I will abstain from the use of intoxicating liquors, and will at all times be strictly temperate; that I will faithfully observe all the rules and regulations governing employees which the management may from time to time establish, and willingly perform all duties assigned me; that any wages earned by, or owing me, shall not be due and payable until the regular pay day of the said employer. When my employment with said employer ceases, I will at once return to him all badges or other property of said employer in my possession, or pay for the same at a price fixed by the said employer.

And I further agree that I will at once return to said employer any badges or other property of said employer, or any property I may have received from any other source arising out of my connection with said employer after I have been discharged, or my employment in any way shall cease, and agree that 25 cents per day can be deducted from

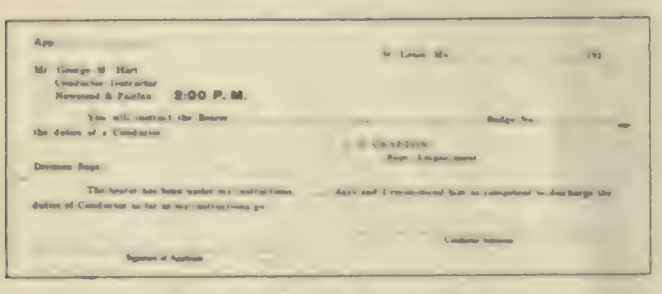
my pay due me for each and every day that I fail to return same, as liquidated damages for such failure.

And I further agree that any wages due from said employer when my employment under this contract shall terminate shall be retained by said employer until said property is by me delivered to said employer.

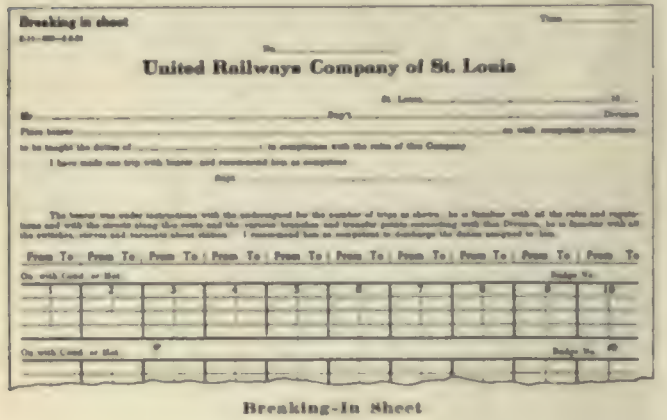
I am informed as to the character of the work for which I am an applicant, its conditions and requirements, and rate of wages, and I am in earnest in my desire to enter and remain in said employer's service, and as evidence that I am not trifling with the question or uselessly consuming the time of the employer's officials in considering my application, I agree that if I voluntarily leave the employer's service within ninety days after the date of my employment the company shall retain as liquidated damages the five dollars ($5) deposited by me upon entering the company's service.



Preliminary Application Form



Authorization for Instruction



Breaking-In Sheet

*I have made truthful answer to every question in my application;* as a guarantee of which I hereby agree that if at any time it develops that any written answer I have made is untrue or if said employer should find my references or my past record not entirely satisfactory I will accept discharge from the employer's service without protest.

*I promise to deal honestly with said employer*, and if at any time in the performance of my duty of motorman I fail to use my utmost endeavor to have a fare deposited in the box or to get a proper ticket or transfer or other authorized form of transportation from each passenger boarding car, or if I in any manner become possessed of a fare and do not deposit same in the box, or in any manner prevent the company coming into possession of its rightful fares, I agree to accept discharge without protest.

To provide myself with a standard uniform in accordance with the rules and regulations of said employer before assignment to duty.

CAUTION

Statements made by you and references given in your application are fully investigated. False statements render you liable to a fine or imprisonment under the Penal Law.

I have read all of the above, I understand it, and sign knowingly and voluntarily.

Two other signatures are required of the new man. One relates to his wages during the breaking-in period and appears on the application blank. It reads as follows:

I agree to break in as motorman on my own time without any remuneration from Rolla Wells, receiver of the United Railways Company of St. Louis. If I finish the breaking-in period, said receiver is to pay me $15 for the breaking-in period (not less than fifteen days), provided I remain in his service ninety days or longer; said payment to be made after I have been in his service thirty days and passed all the requirements. But, if I am discharged or resign, before I have been in his service ninety days, or for any reason fail to remain in his service ninety days, the $15 advanced me shall be taken from any money due me at the time I leave his service. (*Experienced men do not receive any money for breaking in, neither do men who have been a conductor or motorman, in changing from one position to the other.*)

The other agreement relates to the use of intoxicating liquor. Every employee has to sign an abstinence pledge reading as follows:

I, ....., hereby promise that, in consideration of being retained in the service of the United Railways Company, I will, whilst I remain in its service, totally abstain from the use of all intoxicating liquor, both whilst on duty and off, nor will I visit or frequent saloons or gambling places, and I further stipulate that if I violate this agreement, I will accept discharge without notice and will forfeit to the company all wages due me or money in the custody of the company at the time of discharge.

This pledge is subscribed and sworn to before a notary public.

On the day that the new employee files his final application, he also receives his badge. As employee transportation is entirely on badge, the new employee agrees to use it only in accordance with the regulations of the company, to deposit a dollar as security for its proper use and care, and to return it when employment ends or when requested to do so. In case it is not so returned, the employee agrees to pay the company for each day the badge is retained the sum of 50 cents as liquidated damages. For office employees the deposit required for a badge is $2 instead of $1. Two card records are kept of all badges issued, one under the name of the employee and the other under the number of the badge.

After this application for employment has been accepted by the company and the applicant has purchased his uniform, the company's photographer takes two photographs of him for the company's files. One of these photographs shows him with his cap on and one without the cap. The applicant is then assigned to some depot.

## Forms Used During Instruction

When he goes to his depot, the new employee, if a conductor, carries with him a blank like the second one reproduced in which the superintendent of employment authorizes him to receive instruction. A blank very similar to the one illustrated, but addressed to the motorman instructor, is used for applicants for the position of motorman. As will be noticed, the blank carries space for the signatures of both employee and instructor when the new man has become competent to

operate a car so far as that particular instruction goes. During this period of instruction, the company keeps a record of the names of the instructors for each new man on what is called a "breaking-in" sheet. The upper part of one of these sheets is reproduced. In addition to the names of the instructors and the time they spent with each man this blank contains, at the bottom, space for the signatures of the two supervisors and the superintendent in charge, the name of the depot to which the man is assigned and the name of the foreman. When considered by these officials to be competent, the man is told to report to the employment office for his final instructions.

At this time he brings his filled-out "breaking-in sheet," which is stamped with the date and the number of days that he has been breaking in on the road. He then receives his "ready for work sheet," illustrated, in which he acknowledges the receipt of his badge, ticket punch and pocket book, all of which he agrees to surrender on leaving the employ of the company or pay for them at a definite price. This form also serves as authority to the division superintendent to put the new man at work. At this same time the new man signs and dates another card, known as his "signature reference card," which goes to the general timekeeper, who keeps these cards on file for reference as to signatures. At the same time he receives a card explaining that every day of the year the name and number of hours work by each of the conductors and motormen employed reach the accounting department to be entered on the payroll. To avoid errors in crediting this time, experience has shown that observation of the following rules is essential:

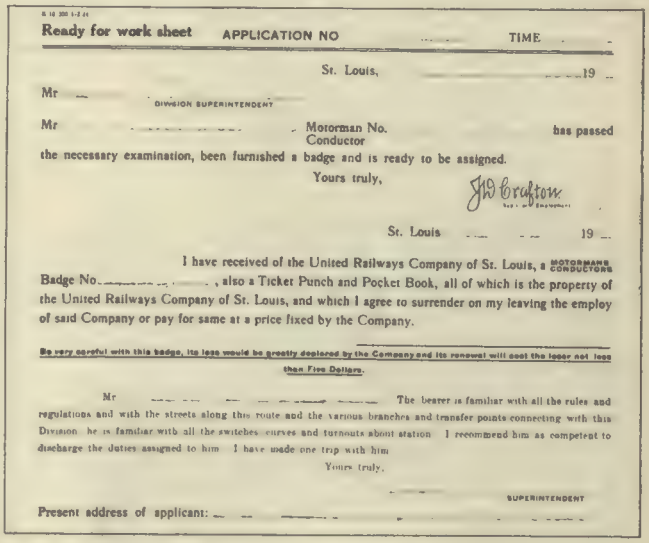
1. That the signature be made the same in every instance.
2. That the name be plainly and legibly written.
3. That the pencil be used rather heavily, making the signature plain and black.
4. That the signature bear either the usual two initials, first name in full with middle initial or, when the person has no middle initial, the first name in full, though usual abbreviations, such as Geo., Jno., etc., may be used, if desired.

Before motormen are sent to the depots to which they are assigned, they go back to the motorman and instructor for final instructions, but conductors go immediately to their depots.

During their breaking-in period both conductors and motormen are taught the proper way to fill out an accident report. The company uses two forms of accident reports, one to cover collisions with vehicles, persons or cars, the other all other kinds of accidents. The instructions at the top of the blank say:

Conductors and motormen are required to make written report of all accidents, disturbances or occurrences out of the ordinary. Collisions, accidents, persons falling on the car, falling getting on or off, falling approaching the car or after they have safely left the car, fights, quarrels, disputes as to fares, transfers or change, injuries from any cause, even though the persons may say they are not hurt; report it all; do not try the case and conclude that a report is unnecessary; that is the duty of our attorneys after reading your report. Give names and addresses of all injured persons and witnesses. Take pains in making report; write plainly, conductor and motorman both signing same report.

Before they start in, each employee receives a rule book, for which he signs a receipt and agrees to return on request or when he leaves the service; a map of the city of St. Louis, showing the tracks of the company and those of connecting electric railways; an up-to-date list of the numbers of lost or stolen badges, so that these badges can be taken in if they are presented for transportation, and a witness slip book. He also receives three envelopes addressed to the superintendent of employment, which he is asked to send to three different persons for letters of reference, to be mailed back direct to the superintendent of employment. Conductors also receive a witness slip book and punch and motormen a small book of instructions on the use of



Ready for work sheet APPLICATION NO ..... TIME .....

St. Louis, ..... 19 ..

Mr ..... DIVISION SUPERINTENDENT

Mr ..... Motorman No. / Conductor ..... has passed the necessary examination, been furnished a badge and is ready to be assigned.

Yours truly,

J.W. Crafton

St. Louis ..... 19 ..

I have received of the United Railways Company of St. Louis, a MOTORMAN'S / CONDUCTOR'S Badge No. ....., also a Ticket Punch and Pocket Book, all of which is the property of the United Railways Company of St. Louis, and which I agree to surrender on my leaving the employ of said Company or pay for same at a price fixed by the Company.

Be very careful with this badge, its loss would be greatly deplored by the Company and its renewal will cost the loser not less than Five Dollars.

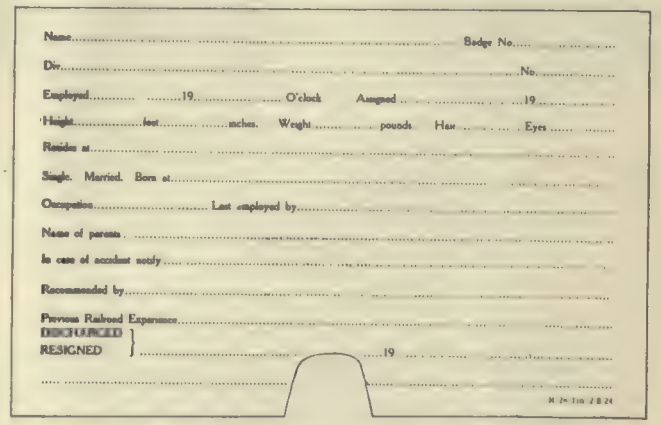
Mr ..... The bearer is familiar with all the rules and regulations and with the streets along this route and the various branches and transfer points connecting with this Division. he is familiar with all the switches, curves and turnouts about station. I recommend him as competent to discharge the duties assigned to him. I have made one trip with him.

Yours truly,

..... SUPERINTENDENT

Present address of applicant: .....

**Ready for Work Sheet**



Name..... Badge No.....

Div..... No.....

Employed..... 19.. O'clock Assigned .. 19..

Height..... feet..... inches. Weight..... pounds Hair..... Eyes.....

Resides at.....

Single. Married. Born at.....

Occupation..... Last employed by.....

Name of parents.....

In case of accident notify.....

Recommended by.....

Previous Railroad Experience.....

DISCHARGED / RESIGNED } ..... 19 .....

**Card Used for Motormen's Record**

the Economy meter. The company also has a blank form of letter used to send to references.

All of these forms, when filled out and returned to the employment and record department, are filed in a special envelope, known as the application envelope, with appropriate filing data on the face of the envelope.

## Records After Engagement

The company keeps a card list of all employees in the general form of that illustrated on this page. The one shown is on manila stock and is for motormen. A similar card on blue stock is used for the records of conductors. Supplementary cards, somewhat smaller and of the same colors, which can be clipped to these cards, are employed to record any changes in the wages per hour paid to the individual employees.

No wages are paid to new employees for their time during their breaking-in period unless they remain in the service for 90 days. In that case, conductors receive $10 for the last ten days and motormen $15 for their last fifteen days of breaking in. When these

payments become due, they are made on a special form of check on which the application number, badge number, date of employment and name of employee are given, with a space on which the employee receipts for the payment.

### When an Employee Leaves

When a conductor or motorman leaves the service or is suspended, the superintendent or foreman in his division forwards to the employment and record office a statement on a blank provided for that purpose, giving the reason for his discharge, resignation or suspension, the date of his employment and his application number, badge number and future address. On receipt of this information, the employment office immediately notifies the claim department, sending at the same time a record of all accidents in which that particular conductor or motorman was concerned, so that if the claim department needs his testimony in any case, a deposition can be taken from him before he leaves.

After a conductor or motorman has left the service, his records are transferred from a "live" to a "dead" file, but they are retained intact for possible use.

## Boston Transit Problems Explained in Radio Interview

AN INTERVIEW with Edward Dana, general manager of the Boston Elevated Railway, Boston, Mass., in which many questions of popular interest regarding that system were answered and broadcasted, took place on the evening of Oct. 24 at station WEEI of the Edison Electric Illuminating Company of Boston. Mr. Dana has given a number of radio talks in times past on the Boston transit situation. Mr. Dana asked and answered questions on traffic, mileage, employees, revenue, safety in operation, motor bus operation, electrification, etc. He concluded his talk by narratine the most humorous story that has come to his attention in the long life of his service on the Boston "L."



Hyatt Roller Bearings Are Mounted in Totally Inclosed Journal Boxes Arranged to Be as Nearly Oiltight as Possible

## Chicago Surface Lines Trying Roller Bearings

A SAMPLE train of the Chicago Surface Lines consisting of a motor and trail car unit operating on the Madison Street line has been equipped for experimental purposes with Hyatt roller bearings on all journals of both motor car and trailer.

This installation has been made to obtain data on the effect of these bearings on the power consumption, and also to determine by actual operation over an extended period of time the way in which this type of bearing will stand up under the operating and maintenance conditions encountered.

A hardened steel sleeve is pressed on each journal to take the wear of the rollers, and the front covers of the boxes are tightly bolted in place to make the boxes as nearly oiltight as possible.

As the installation has been in service for only a few weeks, no definite data on the relative power consumption on this train as compared with standard babbitt-lined journal bearings is as yet available. However, in these few weeks of operation, no difficulty has been experienced.



Roller Bearings Are Being Tried Out on the Journals of This Two-Car Train Operated on the Madison Street Line, One of the Heaviest of the Chicago Surface Lines

# Applications of Modern Methods in Accounting Practice

*By W. L. Davis*
Auditor Lehigh Valley Transit Company, Allentown, Pa.

**In This Concluding Installment of This Series on Present-Day Electric Railway Accounting Practice, the Principal Topics Discussed Are Budgets, Fixed Capital Records, Daily and Weekly Reports and the Use of Machines in Accounting Offices**

THE executives of any electric railway company should be furnished with operating and construction budgets, either annually or at specific periods. These budgets should include not only the estimated income and expense for the particular period covered, but also the construction work considered necessary or desirable during the same period, the net return after operating expenses, fixed charges and dividends being supplemented by such new money as might be required for the company's construction program.

While the budget may be compiled by the accounting department, it is obvious that the basic figures used be furnished by operating engineers and others familiar with the physical requirements of the company, this information being supplemented by a study of economic conditions to the extent that earnings may be forecasted to a comparatively accurate degree and increases or decreases to operating expenses may be anticipated to some extent.

In the preparation of the budget, the income account should receive attention before the amount of new money is determined. In order to do this it will be necessary to study current conditions and determine the increases or decreases in the earnings as compared with the prior year, taking into consideration any economic conditions which may affect the return. If the earnings are compared from day to day and month to month the percentage of comparison arrived at may be applied to the earnings of the year just passed and figures for the coming year forecasted accordingly.

Operating expenses should be reviewed in detail and present average costs applied to the operating and maintenance schedule as determined for the coming year by the operating department. This should also take into consideration economic conditions. The schedule of operation and maintenance work should of course be compiled on a tentative basis for comparison with the income as forecasted and changes made accordingly before the budget is finally prepared and furnished to the various departments. The operating expense budget should be compiled in such a way that each department head will get the benefit of the estimated cost for his department as he should compare the estimates with the actual costs from time to time as they are incurred. The Operating Expense Budget should also contain the necessary figures on general expenses and taxes. These figures can usually be determined by the accounting department to a fairly accurate degree.

In connection with the operating expenses, there should also be included any contemplated expenditures for increasing the amount of material on hand for operating purposes, with particular reference to fuel stock. Fixed charges are easily determined and may be included by the accounting department as required. Dividends should be included in the budget only after the company's policy is determined.



*A Typical Modern Railway Accounting Office, Showing Extreme Use of Tabulating Machines*

Construction expenditures should be included after the cost of the various jobs has been determined by the department heads responsible. It might be well to compare the contemplated construction expenditures with the result of the estimated income account before the budget is finally prepared, as it might be necessary to eliminate some of the items, particularly if conditions are such as to render new financing difficult.

After the construction expenditures are finally determined upon, the amount of new money required should be computed and reflected in the budget either as cash to be raised from the sale of bonds or as an item subject to short term financing. This latter subdivision of course depends to some extent upon the class of construction work contemplated and the subdivision of the final accounting between capital and non-capital expenditures.

The preparation of the budget as described above cannot be handled with any degree of satisfaction unless the records of the company are drawn up in such a way that

EDITORS' NOTE.—The previous installments of this article appeared in the issues of this paper for Sept. 27 and Oct. 4.

the revenue accounts and details of charges to operating expenses are readily available. Proper comparisons cannot be made between the actual transactions of the prior year and the contemplated operations of the coming year unless the factors entering into both are easily comparable with each other.

It would appear that there is a responsibility on the part of the head of the accounting department to prepare his daily records in such a way that this information can be had, and toward this end it is recommended that the daily transactions be recorded in self-analyzing form as far as possible. This information should be available to the operating and construction engineers who are responsible for the preparation of the basic figures for the budget.

It is obvious that the conditions in our industry are such that it would be somewhat difficult for a department head to live up to the letter of his budget and at the same time take care of unforeseen requirements as they come up, and accordingly, it will often be necessary to prepare revisions of the budget and supplements thereto. These should be prepared along the same lines as the budget itself and should cover the same period.

It will also be advantageous for the company to prepare at different intervals a statement of estimated cash receipts and requirements for a stated period ahead. These estimates, of course, contain the same elements as the budget, but as the budget is necessarily based upon figures which contain a certain number of accrued accounts and other similar transactions not representing actual cash receipts and disbursements, the budget and cash requirements statement can hardly be expected to parallel each other in all respects.

The statement of cash receipts and requirements should reflect the months in which the receipts may be expected and payments made, together with the dates at which temporary loans are to be made during the year. In order to prepare this statement accurately it will be necessary to review the items set up in the annual budget with a view toward eliminating from the cash statement any items representing large quantities of material to be issued from stores and similar items which must be charged to the operating and construction accounts for which no cash need be spent during the particular period. This statement should also be reviewed from time to time and changed in accordance with current conditions.

### Fixed Capital Records

One of the comparatively recent developments in the electric railway industry is the fixed capital record, or perpetual inventory of property. This is not strictly an accounting department function, but the preparation and handling of a record of this kind is dependent to a great extent upon the records kept by the accounting department, both past and present.

A fixed capital record should include all of the various property units, and should be based upon a plant inventory compiled as of a specific date. This basic inventory is supplemented by additions covering new property and withdrawals covering units withdrawn from service for one reason or another. After costs are applied thereto and recognized elements of intangible costs are added, the fixed capital record may be used as a property valuation.

The preparation of the physical data and the application of intangibles are usually handled under engineering supervision, but it is often necessary to refer to the records of the accounting department to secure cost data of various kinds. This work has resulted in revealing numerous defects in the accounting records of former years, and although the present-day auditor cannot do much to correct the mistakes and inaccuracies in old records he should profit by such omissions and handle his current work in such a way that construction costs may be determined to a reasonably accurate degree.

In handling construction costs, the best results can be attained by using the work order method. A separate work order is assigned to each construction job and charges are made accordingly during the process of the work. Each work order should be reviewed by the accounting department in advance in order that proper distribution of the costs by accounts may be determined. The daily and monthly charges to the work orders should also be distributed as to accounts as the costs are incurred.

Overhead charges should be determined and applied monthly wherever possible. After the work is completed, the cost thereof should be analyzed as to labor, material, and other elements, and the complete analysis subjected to a check with the physical conditions. After the costs are subjected to the physical check, results of the work order can be included both in the general ledger and fixed capital record with the assurance that the entries in both records contain the same elements.

Property retirements can be recorded very readily if the company maintains a fixed capital record, as the description of the retired property as set forth in the fixed capital records may be supplemented by estimated costs of installation.

The fixed capital record can also be used in determining divisional investments and operating costs and will be found valuable in other ways. The initial cost of such a record is quite heavy, but if accurate construction accounts are kept, it will not be difficult to keep it up to date, thereby affording a basis for a valuation at any time.

### Daily and Weekly Reports

It is very important that the executive department be advised of current conditions as reflected by the accounting department records, but the requirements of the various companies are so widely different from each other that no two managements will expect exactly the same kind of information along these lines.

The accounting records of any company can be arranged in such a way that they could, if necessary, be closed daily, but as this would entail considerable expense and require a large organization it is hardly necessary to consider it at this time. However, it will not be difficult for the accounting department to furnish daily information to the executive covering certain functions of the property. Most electric railways account for their receipts on the daily basis and it is a comparatively easy matter for the accounting department to prepare a summary of such receipts from the original records.

These daily reports should be made divisional in form and show the day's earnings on each division as compared with the corresponding day of the prior year, tabulating increases and decreases on each line, with percentages if desired. This report might also show the corresponding figures for the month to date, which can easily be compiled in cumulative form from day to day.

In this connection it might be said parenthetically that the figures for the previous year may be tabulated in advance.

It might be of interest to the operating executive if this daily report would show not only earnings, but car mileage and car hours on the various lines from day to day during the month, thereby avoiding the delay in receiving the complete operating report, as the final report must necessarily be delayed for some time after the month's accounts are closed. This information might also be supplemented by tabulations showing the various operating costs per car mile and car hour if such information is considered necessary. This report can be made to include as many daily figures as the executives may need, and if the required figures are prepared and tabulated daily as a part of the routine it will not present any serious difficulties to the accounting department.

Daily reports of cash should also be prepared for the information of the treasury department and other officials who may be interested. These reports can also be compiled on a daily basis without much difficulty if the routine is established accordingly.

### Use of Machines in Modern Offices

It would be manifestly difficult for any auditor responsible for the efficient handling of an up-to-date accounting organization to attempt to get along without some of the up-to-date machines designated to reduce work and promote accuracy. We are all more or less familiar with some of these machines, but in an article reviewing the requirements of the present day accounting department it will not be amiss to compare some of the work now being done with what had been done prior to the development of this apparatus.

Almost any one knowing anything at all about office routine understands the operation of the adding machine, but it has only been during the past twenty years that these machines have been used to any great extent. In former days it was necessary to prepare trial balances and monthly reports by hand and add them mentally, but if the 1924 office were to be handled strictly on that basis it would be almost impossible to handle the current detail requirements without a substantial increase in the payroll, which would be entirely out of line with our present ideas of what this kind of expense should be.

Adding machines, both listing and non-listing, have a large field of usefulness and if properly handled will enable the accounting department to save many times the interest on the investment in the course of a few years, but on the other hand if they are not properly used they can become a burden to the organization. While it undoubtedly promotes accuracy to use these adding machines for as many different purposes as possible, on the other hand their use should not be encouraged to such an extent that the ordinary employee cannot handle the simplest kind of addition without them. The requirements of the department should be studied and machines used wherever practicable, but there are numerous small self-checking computations which properly trained clerks can handle mentally.

The routine work in the accounting department is such that computation of averages, percentages, and proration schedules are required almost continuously, and it would be manifestly difficult for any office management to handle the requirements without the use of some one of the numerous machines designed to handle problems in multiplication and division. There have been substantial developments along these lines during the past twenty years and the initial investment on these machines and the expense in carrying them are almost negligible in comparison with the benefits derived from their use. However, the use of these machines can also be developed to such an extent that the office employees are practically helpless without them, and while it is somewhat difficult to avoid this situation and still receive the benefit of the use of these machines, the auditor should watch the conditions carefully and see that the mental capabilities of his employees do not become neglected.

The development and use of the typewriter during the past twenty-five or thirty years has also brought with it a number of new inventions designed to take care of the preparation of numerous copies of reports, schedules, analyses, contracts and other tabulations and documents of every description. These inventions have enabled the modern office to turn out reports with twenty-five, fifty and one hundred copies, which would have been almost impossible under conditions that existed a generation ago.

The present requirements of the accounting department include the preparation of numerous daily, monthly and other periodical reports on financial conditions, income, details of revenue, details of expenses and the like, and as these statements usually show both red and black figures it was necessary to develop some kind of operation wherein the two could be handled at the same time. In this direction the recent inventions of the duplicating machine companies have been almost invaluable. It is now possible to insert in the typewriter a ribbon with two colors of heavy ink on it and tabulate a statement showing both red and black figures with one operation. This sheet can then be used in connection with a duplicating machine and as many copies prepared as would be required under ordinary conditions. These machines, however, are subject to some limitations, as it is not possible to procure more than one hundred legible copies at one operation and often conditions are such that only half that number can be had. In order to take care of this difficulty, a stencil machine may be used in connection with which the typist can prepare a master stencil from which copies can be run off almost indefinitely. In connection with this operation, however, it is rather difficult to insert red and black figures on the same tabulation without performing considerable additional work.

### Computing and Tabulating Machines

The detail work in the large electric railway office is such that the computing and tabulating machines can also be used to advantage, especially in preparing revenue and traffic statistics and similar information where the bulk of the work is such that the assorting and assembling of such figures by hand would entail a prohibitive cost. The man in charge of this work should keep in touch with his requirements to such an extent that he can recommend the installation of these machines when economies can be effected.

During recent years the preparation of freight waybills has undergone a considerable change. In former times these waybills were made by hand and copies made by means of old-fashioned copy book

and press, but later this work, to a great extent, was superseded by the use of machines from which numerous copies could be prepared at the same time either by hand or by machine process similar to that of the typewriter.

The work in connection with counting daily cash receipts and ticket collections has also been facilitated during recent years by the invention of ticket counting and coin counting machines. By the use of these machines the accounting department has not only reduced the time required in handling this detail work but has also developed the checking of conductors' returns to a more accurate degree than was possible in the past.

There are numerous other machines of different kinds which the modern accounting department can use, and it will be of considerable advantage to those in charge of the accounting departments of the various companies to keep in touch with these inventions and see that their companies get the benefit of them as soon as possible, with due consideration for the usefulness of the machine to the particular organization and the return on the investment to the purchaser.

In conclusion it might be said that the man at the head of the accounting department of the modern electric railway should build up an organization and an accounting system that will enable him to handle present-day requirements promptly, satisfactorily and economically, and at the same time give him enough time away from routine and special requirements that he can develop his own capabilities and study the present and future requirements of his position.

# Educational Program in Boston

**Boston Elevated Railway Announces Five Series of Departmental Group Conferences for Employees, with Other Advanced Courses — Arrangement with Massachusetts Department of Education Effected**

THE program of the educational courses to be open during the season of 1924-1925 to employees of the Boston Elevated Railway are announced in a circular just issued by Edward Dana, general manager. Altogether there are four series of group conferences for male employees, conducted respectively in the transportation, rolling stock, maintenance and power departments, and a series of conferences for the women employees, for the purpose of informing them as to some of the general problems of the railway. In each case, the conferences begin with a half-hour talk on some specific topic by a well qualified speaker, followed by a discussion occupying not more than 1 hour.

In addition to these group conferences, there will be a few general meetings during the season, at which the general manager, his representative, or an outside invited speaker will give a perspective view of some of the larger aspects of electric railway operation. A third branch of the educational work on the Boston Elevated is an arrangement with the Massachusetts Department of Education, Extension Division, by which certain courses in applied mathematics, practical electricity, and dynamo electric machinery will be open to employees if a sufficient number enroll. All these meetings begin early in November.

Most of the group conferences will be held in the rooms of the instruction school which has been fitted up at the Sullivan Square station, but some of the conferences of the rolling stock group will be held at different points in the Everett shops.

A brief summary of the scope of the topics to be pursued by the various departmental groups follows:

The maintenance group, John B. Flaherty, chairman, will hold 19 conferences, taking up such widely varied topics as track, signals, stores, equipment, accident prevention, relation of maintenance department to state, city, and town officials and to labor organizations, etc. No fee is charged for this group.

The power group, Joseph A. Howard, chairman, takes up the operation and maintenance of the steam equipment with special reference to combustion, and the operation and maintenance of the electrical equipment, including the substations and distribution. If sufficient enrollment is secured in this group, arrangements may be made with the State Department of Education, Extension Division, to furnish the instruction in the course. A nominal fee will be charged for this instruction, but it will be refunded by the trustees to all who complete the course to the satisfaction of the Department of Education.

The rolling stock group, John Lindall, chairman, will hold 20 conferences on such topics as car construction, car body repairs, trucks and truck maintenance, railway motors, control equipment, air brakes, shop practice, and buses. No fee is charged in this group.

The transportation group, E. A. Kelley, chairman, will hold 20 conferences on such topics as accident prevention and reports, relations with employees, treatment of passengers, carhouses and stations, the bus and its place in transportation, power saving, fare collection on cars, traffic surveys and time-tables and handling street traffic. No fee is charged in this group.

The women's group, Miss E. E. Mullen, chairman, will have 12 informal talks by experts if there is sufficient enrollment. The topics were selected by a committee of women employees and include accounting and auditing, accident prevention, collection and registration of fares, economical operation of cars, relations with employees, maintenance of track, snow fighting, public relations, and financial features of electric railroading. No fee is charged in this group.

## Buying Coal for Employees of a Small Railway

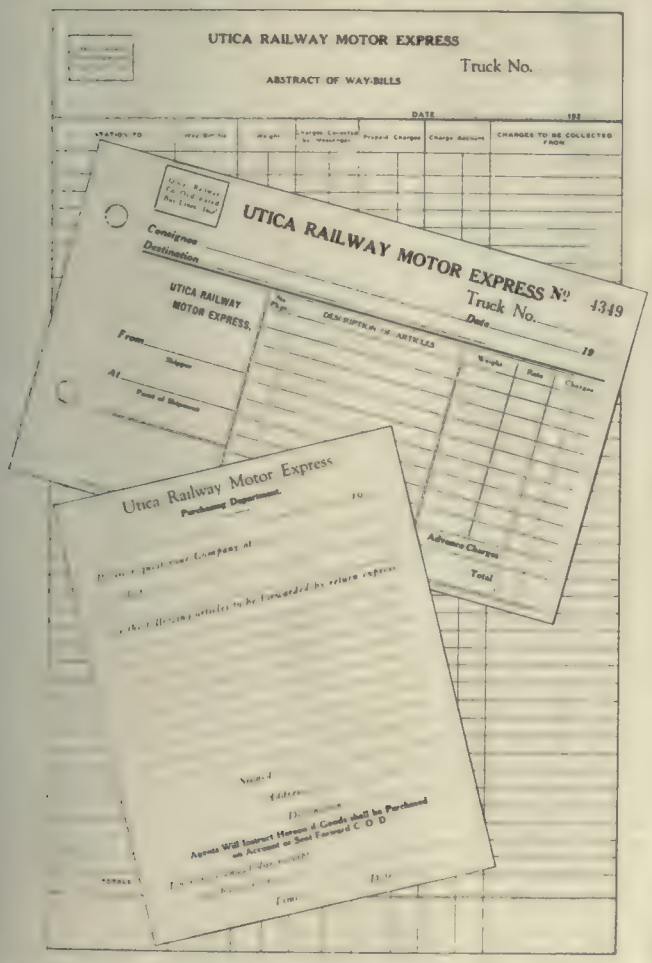
A SIMPLE method of buying coal for employees and distributing it to them has been followed for several years by the Beech Grove Traction Company, Indianapolis, Ind. Coal is purchased by the railway in carload lots. The car is placed on a convenient siding and the employees send and get the coal, paying the cost of haulage themselves. The company is paid for the coal on the installment plan.

# Trucks Used by Railway for Local Freight Haulage

**The New York State Railways, Utica Lines, Has Inaugurated a Trucking Service in Addition to Its Regular Electric Express and Freight Service**

BY F. W. WATTS
General Express Agent New York State Railways, Utica Lines

SOME time ago the New York State Railways, Utica Lines, found that the freight and express department was steadily losing business to various unorganized motor truck competitors. In spite of the irregular service furnished by these competitors, their fluctuating rates, and the irresponsible method of operation, the merchants and wholesalers of the district were diverting more and more of their business from the railway to the trucks. It was felt by the management, therefore, that the institution of a financially responsible line, with regular service, reasonable and fixed rates and proper equipment for all year operation would recapture the business and provide a new source of revenue for the railway.




These Simple Forms Have Reduced to a Minimum the Amount of Clerical Work Necessary

With this end in view a trucking service was inaugurated, operating from Utica as the center, and serving the towns of Rome, Frankfort, Ilion, Mohawk, Herkimer, Little Falls and Dolgeville. The equipment used consists of two 3½-ton White trucks and two 2-ton White trucks with special covered bodies. The type of vehicle used is shown in an accompanying illustration. The trucks operate within an area outside the city, handling the express business as well as special truckload lots of fruit, vegetables and manufacturing material. The cars continue to handle the long distance and heavy freight.

At the very outset it was discovered that the problem was not only one of transportation, but also one of salesmanship. Business could be secured in the face of the existing intense competition only by a picked personnel. A crew of two men was placed on each truck, to drive, load, and unload and also to secure business. This arrangement has resulted in a considerable saving of time in loading and unloading, and in a gratifying increase in traffic on account of the success of the crews as business getters.



New York State Railways Does Local Express Business with Trucks of This Type

For example, when delivering goods to a dealer in a small town from a wholesaler in the city, the crew carries order forms and makes it a point to inquire if the dealer wishes to order anything from his wholesaler the next day. In case he does, the order is taken by the driver, presented to the wholesaler the same afternoon, and the goods are delivered by the driver to the dealer the next morning. Trucks call daily on every dealer and wholesale shipper in the district. These truck calls are in addition to the constant canvassing which is done by the general express agent and by his assistants.

Claims for loss or damage are less with the trucks than they have been with the company's electric cars. This is due largely to the fact that the truckmen have an eye on the load all the time, thus preventing loss by theft or mishandling. Moreover, the chance of damage in transit is reduced by the fact that the material is handled only twice—once in loading and once in unloading—instead of several times, as might be the case if it were transferred from the truck to an electric car, and then from the car to the truck again for delivery. The fact that the goods proceed in an almost direct line from the shipper to the consignee has reduced to a minimum the time required, and has also eliminated the expense of operating freight terminals. While the rates secured are not as high as those paid for shipments by railway, the cost of operation for doing this type of business is considerably less than it would be by electric car. Combined with a reduction in the overhead expense and damage claims, this has made the motor truck operation a profitable adjunct to the company.

# Association News & Discussions

## Lay Your Money on the Counter*

### The Way to Tell the Railway Story Is to Buy Space in the Advertising Section of the Newspaper, Not to Beg Space in the News Columns

BY W. P. STRANDBORG
Publicity Manager Portland Electric Power Company

WE ARE confronted with a strange situation in our present-day affairs. The two greatest constructive forces shaping the social, political and economical destinies of our American people are the public utilities and the public press. And yet as monumental institutions of progress they understand very little about each other.

A mighty change has been coming over the public utility industry of late and it is one of the most hopeful signs for the future. Only a few years ago the public utility men of the country believed that there was only one department of the newspaper business which was of any concern of theirs. That was the news columns. By all odds the most valuable part of the newspaper is the one which the average utility of ten years ago thought it was perfectly proper to raid whenever it wanted to tell some message to the public. Utilities sincerely and honestly believed that they had a right to full and free access to the news columns for every kind of utterance, no matter whether it had legitimate news value or was of the most malicious type of propaganda.

There are still quite a number of utility men in the United States who hold the same pitiful misconception of what a newspaper's duty is to its readers with reference to the selection of material that is to go into its news columns. I have no more patience with a newspaper which will accept and publish free of charge in its news columns, without weighing it scrupulously in the balance of public interest, material offered for publication by a utility, than I have with the public utility company which tries to sneak such stuff into the papers. In cases of that kind, the newspaper man and the utility man are equally discreditable to their respective businesses.

For a number of years a small group of the younger generation of utility men has been striving valiantly to hurl forever into the limbo of forgotten things the pernicious press agent and free propagandist. We regard him as an anachronism and an unmitigated evil, and I am happy to say that we can report substantial progress in all sections of the country. We started so late, however, and have had so much ground to cover that up to the present time we have hardly been able to more than scratch the surface. We are pledged to work with our managers and executives in the public utility industry to the end that we may convince them that the best policy is to place the copy on the counter with the cash in the business office downstairs. If we want to have any dealings with the city editor and his staff upstairs, we should carefully search our pockets to see that they are not contaminated with any typewritten copy for the news columns.

We honestly hope that the day will come when we can have the daily newspapers of the United States coming to us and asking us for news, and so far as possible to keep ourselves free from even offering a suggestion to a newspaper as to what might or might not constitute a news story relating to any of our activities, policies or business affairs.

#### PROGRESSIVE POLICY ADOPTED BY UTILITY COMPANIES

We hope that we may enlarge, so that it will cover the entire country, a policy which has been recently adopted by some of the larger and more progressive public utilities in dealing with the editorial and news departments of the daily press. We believe that every public utility company in the country, large or small, should have a man within the organization who has some knowledge of the newspaper business. This man should make it a point to become thoroughly conversant with every phase of his company's activities in the community. Then he should make it a point to visit frequently, perhaps once or twice a week—or oftener if necessary—the city editor, the reporter who handles the industrial beat, and the editorial writer who comments on industrial matters.

This representative of the public utility should sit down and tell the city editor or the reporter or the editorial writer, or all three of them, just exactly what is going on in his company, what it is doing, what plans it has for future expansion, what it is doing in the way of making its service more adequate and satisfactory. So far as he possibly can, he should add to the mental equipment of these three newspaper men a groundwork of information about his company that will be of value when any real item of interest "breaks." The utility company can never give a newspaper too much information about its business. The representative of the utility company who calls upon the newspaper should be a man of absolute integrity and reliability and he should be permitted to discuss the affairs of his company with the utmost frankness.

This utility man, who is generally dignified by the title of "publicity man," should supplement these visits to the newspapers by keeping closely in contact with everything that goes on in his company that might develop into something which his judgment and experience tells him has news value. He should then telephone the city editors if they think the matter in question has any news value. He should also offer to prepare that material in news form if the city editor thinks it is worth printing, or he should tell the story to a reporter in case it is a matter which can be handled over the phone.

The awakening which has come to the public utility industry is not limited alone to a change in the method of dealing with the new staffs of the press, but carries with it a growing realization that sound business principles demand that the dealings between the utility company and the newspaper must be be largely confined to the business office and more specifically to the advertising manager of the newspaper. Nowadays the more the utility company turns its back on the city editor, the more it faces eyes front to the advertising department, the more sure the utility will be of accomplishing one of its major objectives, namely, the creation and establishment of better public relations. That is why the Public Utilities Advertising Association is advocating so strongly the putting of cash with our copy on the counter.

A high standard is maintained in public utility advertising copy. A survey of the entire public utility field in the United States through the national vigilance committee of the Associated Advertising Clubs and the forty Better Business Bureaus operating in our most important metropolitan districts shows that in the past 12 years, since the "Truth in Advertising" movement was inaugurated, there has not been found a single piece of questionable electric railway advertising copy. Moreover, in the rare instances where the Better Business Bureaus have suggested to other utilities that a change in their copy would conform more closely to the standards set up, these companies have always and without question made the suggested changes. Indeed, a number of the Better Business Bureaus managers have said that if other advertising was as clean as that of the public utilities, they would have to look for another job.

*Abstract of a paper presented at the meeting of the Inland Daily Press Association, Chicago, Ill., Oct. 14, 1924.

## To Advance Railway Interests

**Purpose of the Ohio-Pennsylvania-West Virginia Organization Is to Develop Passenger and Freight Traffic**

MEETINGS have been held at the offices of the Steubenville, East Liverpool & Beaver Valley Traction Company at East Liverpool, Ohio, and a constitution and by-laws have been prepared for the Tri-State Electric Transportation Association. These will be presented at a meeting for permanent organization purposes. H. O. Allison, commercial manager of the Beaver Valley Traction Company, New Brighton, Pa., who sponsored the organization, is temporary chairman.

The by-laws were prepared as the work of a special committee composed of C. M. Marsh, superintendent of the Wheeling Traction Company, Wheeling, W. Va.; J. Howard Maxwell, president of the Steubenville, East Liverpool & Beaver Valley Traction Company, East Liverpool, Ohio; Frank E. Wert, director of public relations of the Pennsylvania - Ohio Electric Company, Youngstown, Ohio; F. B. Lawrence, general manager of the Newell Electric Railway, Newell, W. Va., and E. O. Shyrock, general manager of the Youngstown & Suburban Railway, Youngstown, Ohio.

The constitution stated that the purposes of the organization were the cooperation of the members in the development of the use of electric railways for passenger transportation and freight traffic; the dissemination of information about the service rendered and the economy and convenience of electric railway travel.

If the plans materialize close to 1,800 miles of street railway property will be represented in the association. In the Ohio section buses are being operated quite extensively and the question of admission of such concerns was paramount when the selection of a name was considered. It was held that the association was primarily and fundamentally for the purpose of advancing the interests of electric railways, and that while there was no objection to the admission of railways operating buses and the consideration of them in the transportation need, yet the door was closed to the independent operator of buses.

The committee in charge of the organization work will recommend, among other things, that a booklet be prepared descriptive of the territory and containing a map showing the electric railway lines, time-tables and fares. This would be a source of information for the public placed in public places such as hotels, restaurants, etc. The committee believes that time-tables, advertising cards and the like that are purely local to individual lines can be put out at the expense of the company issuing them. These should be distributed and available at ticket offices, hotels and other points throughout the entire territory. The committee believes that special attention should be given to the investigation and bringing about of a connecting interurban service, and to the interchange of ticket rates and freight haulage for the various companies. It also will recommend a coordination of effort and policy in standards required and in training of employees so that they may be conversant with the particular railway facilities in their territory.

## Job Analysis Promotes Safety*

**Accidents Can Be Prevented by Study of Hazards—By a Similar Process, Courtesy Can Be Taught**

By JOHN J. CONNORS
Safety Supervisor Nashville Railway & Light Company

THE greatest cause of industrial accidents is carelessness. Statistics show that 90 per cent of all accidents could be prevented by the exercise of greater care. After mechanical safety devices have been provided and unsafe conditions are corrected, thereby eliminating the 10 per cent of accidents attributable to these factors, the safety supervisor must direct his efforts toward the elimination of carelessness.

With this objective in mind, the writer early in the year 1923 adopted the job analysis method in investigating the causes of such accidents. Carelessness was thoroughly analyzed. Discussion developed that a man does careless things because of contributing causes such as lack of sleep, worry, grief, anger, hatred, malice, envy, and false estimate of values.

A lineman in climbing a pole, as he nears the top, must negotiate his body through two sets of wires. The secondary or low-voltage set are 18 in. below the primary or high-tension set. For some reason, he passes the harmless set of wires without recognizing this fact and comes in contact with the high-voltage wires and is killed. What is the cause of this accident? Did the lineman enjoy a full period of refreshing sleep the night previous? Was his mind free from worry, grief or other disturbing factors? In his estimation, was doing the job in the least possible time more important than his personal safety?

The accompanying table is an example of the way the hazards of the lineman's job can be analyzed. The hazards of operating a street car can be analyzed in a similar way.

This method of reasoning may be applied also to improve the quality of service, by specifying the things that trainmen should do, and should not do. A small number of additional fares per day may change a deficit into a profit. With this in mind we organized in April of the present year a group of 25 motormen and conductors in what we termed a "salesmanship class." We listed on the blackboard a few factors that were pertinent to salesmanship. The group decided that courtesy was the most important factor, and therefore, this was analyzed. To date, 175 men have completed this analysis, spending one-half day on the company's time for a few days. Using the case method, in which actual situations arising in the daily work of street railway motormen and conductors were mentioned, a thorough analysis of courtesy in dealing with the public was developed, similar in a general way to the safety analysis of the lineman's job.

*Abstract of a paper at an extra session of the National Safety Congress, Louisville, Ky., Oct. 2, 1924.

SAFETY ANALYSIS OF OVERHEAD LINE WORK

| Job | Operations | Hazards |
|---|---|---|
| Setting poles | Raising small end | Pole turning. |
| | Placing deadman | Deadman slipping and pole falling. |
| | Placing pikes | Pike slipping. |
| | Rocking up | Deadman improperly set. |
| | Raising pole with pikes | Pole turning and pikes slipping. |
| | Changing pikes and ground | Pikes slipping. |
| | Lining up | Pikes slipping. |
| | Tamping | Danger of knocking pikes out. |
| Stripping pole | Climbing | Tacks in pole. |
| | | Knots in pole. |
| | | Pole rotten. |
| | | Safety belt in wrong position. |
| | | Pole giving way. |
| | Transferring primaries | Defective rubber gloves. |
| | | Touching other wires. |
| | | Touching ground. |
| | Taking off crossarm | Dropping crossarm. |
| | Loosening guys | Guys coming in contact with other wires. |

## Many Types of Locomotives at the Berlin Railroad Exposition

CONSIDERABLE space at the railroad exposition at Seddin, near Berlin, which opened on Sept. 24 and continued until Oct. 19, was devoted to electric locomotives and motor cars for rapid transit service. The exhibitors of electric locomotives included the German State Railways and all of the principal German builders. Single-phase equipment predominated. Storage-battery locomotives and motor cars for the Berlin rapid transit system and various tramways were also shown. This exposition was held under the auspices of the Verein Deutscher Ingenieure.

One of the most novel exhibits was a 2,000-hp. standard-gage turbine locomotive, with water condenser, exhibited by the Krupp interests. To provide for operation backward, an auxiliary turbine, revolving in the opposite direction to the main turbine, was used. The turbines were geared to the driving wheels. A number of locomotives with Diesel engines were also shown. One of these, of the 1-E type with electric drive and a drawbar pull of 55,000 lb., is for use in Russia.

# Progress in Anti-Friction Bearings*

## Excellent Results Are Quoted on Reduction of Armature Trouble, Increased Interval Between Lubrications and 10 to 22 per Cent Power Saving

By Karl Pforte
Manager Hagen Street Railways, Hagen, Germany

THE reports made from time to time on the use of anti-friction bearings by electric railways indicate their increasing use as well as continuous improvement by the manufacturers. These reports all tend to indicate that roller bearings are more adaptable to street railway conditions than ball bearings. Some users of ball bearings, for example, reported that breakage compelled them to return to ordinary bearings.

The questionnaire upon which the deductions in this report are based was answered in the spring of 1923, inasmuch as the report was intended for the convention of September, 1923. As the latter was postponed to September, 1924, it will be understood that the data are more than a year old and that the actual use of anti-friction bearings is more extensive than the report discloses.

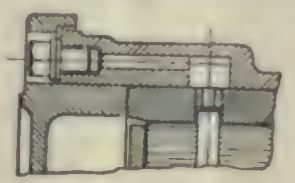
Thirty-seven operators with 20,931 motors reported that 1,107 or 5.3 per cent were equipped with roller bearings, 534 motors or 2.6 per cent with ball bearings and 28 motors or 0.14 per cent with one roller (pinion end) and one ball bearing (commutator end) each. In short, 8 per cent of the motors were equipped with anti-friction bearings. Only two motors had motor axle bearings. These are of the Jaeger roller type and have been in use on the Hagen Street Railway for two years. In October, 1923, the same maker also equipped two motors for the Zürich Street Railways. The makers of the different bearings and quantity delivered follow:

| | Roller Bearings | Ball Bearings |
|---|---|---|
| G. & J. Jaeger, Elberfeld | 746 | |
| Norma Company, Stuttgart-Cannstadt | 225 | 2 |
| S. K. F. Norma, Berlin | 98 | 186 |
| Fichtel & Sachs, Schweinfurt | 22 | 184 |
| Fries & Höpflinger, Schweinfurt | 14 | ... |
| Allgemeine Elektricitäts Gesellschaft, Berlin | 4 | 4 |
| Wälzlager-und Maschinenfabrik, Stuttgart | 2 | ... |
| Kugellagerwerke J. Schmid-Roost, Oerlikon | | 160 |
| Swiss | | 14 |
| Deutsche Waffen-und Munitionsfabrik, Berlin | | 8 |
| Karl Klass, Nürtingen | | 6 |
| Unknown | 24 | 50 |
| Totals | 1135 | 534 |

Among the users are Berlin, 390 motors; Hamburg Elevated, 154; Hagen, 134, and Cologne, 154. Most of the existing installations are of the arbitrary dimensions developed by individual makers, but since the July, 1923, Zürich international conference on standardization the possibility is offered of achieving a certain degree of interchangeability.

The roller bearings are almost always lubricated with grease exclusively, but ball bearings frequently receive oil. The period between grease lubrications averages four months, but between oil lubrications only one month on the average mileage of 4,150 km. (2,580 miles) a month. Some operators report a performance of 45,000 km. (27,900 miles) between lubrication.

Plain bearings averaged per motor per annum a lubricant consumption of 43 kg. (94.6 lb.) compared with 5.8 kg. (12.76 lb.) for anti-friction bearings. The roller bearings averaged 5.7 kg. (12.54 lb.) and the ball bearings, 6 kg. (13.2 lb.) These results mean an appreciable saving in both lubricants and labor.



Method Used in Hagen for Lubricating Roller Bearings Through Screw-Sealed Housing

### Life of Plain and Anti-Friction Bearings

An inquiry into the rate of wear of ordinary bearings showed that the average waste of metal per motor per annum on 35 properties was 8.2 kg. (17 lb.). The rate of wear, of course, is dependent upon the proportion of tin, an expensive ingredient. Thus the Hagen system with a tin base of only 40 per cent showed a wear of 3.2 kg. (7.04 lb.) per motor per annum, whereas in Zürich with an 80 per cent base, the wear was only 0.7 kg. (1.54 lb.). It is possible that the high cost of good tin-base bearings has encouraged the purchase of anti-friction bearings, which, at least, have no such high upkeep costs for relining, lubrication and labor.

Replies in regard to the longevity of anti-friction bearings showed the greatest diversity. A general deduction here would be unfair in view of the fact that the answers are a year and a half old. Some individual records do show long life. The Heidelberg Street Railways has had Jaeger roller bearings since April 15, 1911, Elberfeld has had the same make for 10 to 15 years, and the Barmen Mountain Railway has been using them since pre-war days. These records indicate that the higher first cost of anti-friction bearings is equalized in a fraction of their lifetime.

Some of the troubles reported with motor bearings are obviously the result of avoidable weakness in construction where the trouble is not due to insufficient strength for the load. In the case of anti-friction journal bearings, the faults may be due to such outside causes as bad track. Defects appear as failure of packing and breaks or other damage of raceways, balls, rollers and cages. However, the reports show that the later designs are much freer from these troubles.

The replies also indicated the great protection which anti-friction bearings afford against armatures going down on the pole pieces. On motors equipped with plain bearings, it was necessary to rewind 7.5 per cent of the armatures per annum compared with 0.5 per cent on one property and none at all on the others. This is clear proof of the value of anti-friction bearings in reducing crippled cars and so avoiding the loss of revenue mileage.

The Coblentz Street Railway reported that the use of anti-friction bearings had made possible a 10 per cent reduction in the shop personnel. Other railways also reported a saving in labor. Further advantages named were: Easier starting, less strain on motors, less heating and the exact centering of armatures to insure constant air gap and reduction of latter to 2 mm. if desired.

The many advantages of well-built anti-friction bearings should not only lead operators to replace plain bearings in existing motors, but also induce the manufacturers to use such bearings as standard.

### Anti-Friction Bearings for Journals

Of 32 properties operating 9,004 motor cars, 34 have roller bearings and 224 have ball bearings. Of 7,527 trailers, 110 were equipped with roller bearings and 436 with ball bearings. The total number of anti-friction vehicles was therefore 804 or 4.7 per cent of all cars. It will be noted that the trailers were equipped in the proportion of 7.3 per cent; and the motor cars, 2.9 per cent. The bearings were furnished by the makers.

CARS EQUIPPED WITH ANTI-FRICTION JOURNAL BEARINGS

| | Roller Bearings | | Ball Bearings | |
|---|---|---|---|---|
| | Motor | Trailer | Motor | Trailer |
| G. & J. Jaeger, Elberfeld | 19 | 21 | | |
| Fichtel & Sachs, Schweinfurt | 3 | | 4 | 4 |
| Moffett-Rollenlagergesellschaft, Cologne | 1 | 71 | | |
| Nordiska Kugellager, Gothenburg | 1 | 1 | | |
| Wäring | 1 | | | |
| Norma Company, Stuttgart-Cannstadt | | 10 | | 1 |
| Wälzlager-und Maschinenfabrik, Stuttgart | | 5 | | |
| S. K. F. Norma, Berlin | | 2 | 1 | 25 |
| Ed. Weiler, Berlin-Heinersdorf | | | 105 | 223 |
| J. Schmid-Roost, Oerlikon | | | 94 | 156 |
| Deutsche Waffen-und Munitionsfabrik, Berlin | | | 6 | 2 |
| Ludwig Loewe, Berlin | | | 1 | |
| Karl Klass, Nürtingen | | | | 20 |
| Schuchardt & Schütte, Berlin | | | | 1 |
| Unknown | 9 | | 13 | 4 |
| Totals | 34 | 110 | 224 | 436 |

*Abstract of a paper before the Internationaler Strassenbahn und Kleinbahn Verein, Homburg von der Höhe, September, 1924.

Among the principal users are: Berlin, 222 trailers and 101 motor cars; Zürich, 77 trailers and 87 motor cars; Dresden, 39 trailers and Dortmund, 30 trailers. As with motor bearings, it is expected that standardization will limit the number of types and permit interchangeability.

The lubrication averages show seven-month periods for grease against two-month periods for oil. The average performance per car is given as 3,700 km. (2,294 miles) per month. On the Hagen system, lubricant is delivered to the journal without removing a lid. This is accomplished by forcing the grease through an upper housing ordinarily sealed with a screw. The grease passes through a channel, as shown in the accompanying drawing, whence it bears directly on the two sets of rollers.

The average annual requirement of lubricant for a plain journal is given as 8 kg. (17.6 lb.) as against only 1.5 kg. (3.3 lb.) for an anti-friction bearing. Therefore, a car with anti-friction journals will give five times the mileage between lubrications obtainable with plain bearings.

As regards wear of plain bearings, the replies show almost no use of tin, as might be expected. On the other hand, long life is being obtained from bronze shells. The anti-friction journals are already showing instances of 10 years life or more, both in the ball-bearing and roller designs. Many of the defects are due either to pioneer designs or to some entirely outside cause like track.

### 10 to 20 per Cent Energy Saving

Although few operators have made tests of relative energy consumption, one would not be far wrong in crediting anti-friction journals with a saving of at least 10 per cent. The Malmö Street Railway made the following interesting tests along this line:

A route 3.3 km. (2.04 miles) with very few curves was selected for tests at constant voltage of the power requirements for trailers fitted with plain and S.K.F. ball bearings respectively. The ball-bearing trailer weighed 6,750 kg. (14,650 lb.) and the plain-bearing trailer, 5,810 kg. (12,782 lb.). The test comprised non-stop operation, but no account was taken of the energy used for turning at the ends.

The ball-bearing trailer required an average of 21.5 kw. per ton-kilometer compared with 27.5 kw. per ton-kilometer for the plain-bearing trailer, a saving of 22 per cent with ball bearings new. As the number of stops and curves increases, the saving would become relatively less, say 15 per cent.

Tests were also made for a month with motor cars over routes with few curves, easy grades and long intervals between stops. In this case, the saving was approximately 10 per cent.

One management reported that although anti-friction bearings ran easier than plain bearings on tangents, it appeared that they ran less easily on curves. Dortmund and Göteborg asserted that the anti-friction bearings required more power than plain bearings, but this would not occur with properly designed bearings. The fundamental thing is to purchase bearings of high quality if the advantages of anti-friction bearings named are to be realized. On the writer's property, Hagen, 15 motor cars now on order will have Jaeger roller bearings on the armatures, motor axles and journals.

# Annual Mileage Output per Platform Man*

## Comparative Figures for Car Speeds, Hours of Labor and Extra Allowances Such as Days Off, Sick Leave and Vacations Are Given and Their Effects on Efficiency of the Individual Are Discussed

By K. Norregaard
Manager Copenhagen Street Railways, Copenhagen, Denmark

PLATFORM wages are one of the dominant factors in the cost of operation. There are two ways to attain a saving in this great item—the first is to pay lower wages; the second, to increase the output per man. The latter method is the subject of this paper.

To probe the subject to the very bottom, we ought to be able to determine how many passengers are served per man per annum, but this would require detail study of fares, car-kilometers operated, ratio of seats offered to seats used, density of traffic per kilometer, speed, working conditions, etc. As the data for such an investigation are not at hand, the present study will be confined to a few of the more important factors outside the question of density and earnings per kilometer.

The mileage per man per annum will depend chiefly on these considerations: (1) Average schedule speed; (2) number of men per car; (3) number of workdays per annum; (4) average number of hours per diem; (5) relation of platform to non-platform time.

### Higher Speeds Mean Higher Earnings

The factor of speed is of great importance, not only in the direct relationship between wages and speed but also on account of the greater earning power of faster cars. The increasing competition of the automobile is an added spur.

Speed is affected by the state of the track, by density of street traffic, by trailer and one-man car operation, by the passenger interchange facilities on the car, by the degree of crowding, by the distance between stops, by the location of convenient or safe boarding platforms, by the discipline of the public in boarding and leaving cars, by the character of the control and braking equipment, etc. As to speed, the replies from 65 railways summarize as follows:

| Number of Railways | Km. per Hour | Miles per Hour |
|---|---|---|
| 3 | 11.0—11.5 | 6.82—7.13 |
| 2 | 11.5—12.0 | 7.13—7.44 |
| 11 | 12.0—12.5 | 7.44—7.75 |
| 12 | 12.5—13.0 | 7.75—8.06 |
| 6 | 13.0—13.5 | 8.06—8.37 |
| 4 | 13.5—14.0 | 8.37—8.68 |
| 7 | 14.0—14.5 | 8.68—8.99 |
| 3 | 14.5—15.0 | 8.99—9.30 |
| 17 | over 15 | over 9.30 |

The lowest schedule speed reported was 11 km. (6.82 miles) an hour; the highest, 30 km. (18.6 miles) an hour. The average speed for all roads was 14.8 km. (9.18 miles) an hour. If, however, we omit the 17 roads whose schedule speed exceeded 15 km. (9.3 miles) an hour, the average declines to 13 km. (8.06 miles) an hour. The great spread in speeds is due to the fact that the statistics include cross-country lines with more or less of their track on private right-of-way, hence the higher figures must be regarded with caution.

### Platform Attendance—Number of Working Days

The success of many a railway will depend upon its ability to use such economies as trailers and one-man cars. In the present study, however, we are interested only in the actual miles per man regardless of the number of men per car or train.

The platform man has a number of idle days in the year due to days off, sick leave and vacation. Minor additions are due to instruction periods, misses, etc. The interval between scheduled days off varies from 4 to 16 days, but the average of 67 roads is found to be 52 days a year or every seventh day.

Sick-leave practice is also diverse. A few railways grant full pay for sick leave up to two years, while others do so only for a few days. Some begin with full pay and cut later to 60-80 per cent thereof, and still others show a range of 6 days to 1 year's payment at 10 to 90 per cent of full pay. In general, however, an employee of 3 months' to 1 year's standing will average two-thirds pay for 6 weeks, three-quarters pay for 13 weeks if he has served 1 to 3 years and four-fifths pay for 26 weeks if he has served 3 years or more. A few roads do not pay for sick leave at all.

In reply to the query as to how many days a year are lost because of sick leave, the answers were as follows:

| Number of Railways | Average Days per Man |
|---|---|
| 3 | 4 to 6 |
| 15 | 7 to 9 |
| 14 | 10 to 12 |
| 10 | 13 to 15 |
| 2 | 16 to 18 |
| 6 | 19 to 21 |
| 1 | 22 days |
| 1 | 28 days |
| 18 | gave no data |

The number of days lost through sick leave on half of the properties ranged from 10 to 15 days, and the average throughout was 12 days. These figures are not absolutely accurate, as it is possible that some managements included as "sick leave" periods that would have been "scheduled days off" had the employee been well.

*Abstract of a paper before the Internationaler Strassenbahn und Kleinbahn Verein, Homburg von der Höhe, September, 1924.

Vacations also show a great range of practice. German street railways tend to base vacations on length of service, the vacation periods consequently ranging from 4 days to 4 weeks. Other railways make the employee's age the chief factor. The Scandinavian and Dutch roads tend to the practice of a fixed period like one or two weeks. A few roads grant no vacation allowance.

The average vacation period on 26 roads is found to be 15 days, the range being from 10 to 18 days. In these figures, also, there is the possibility that some roads have figured into the vacation period the "scheduled days off," but this is not of consequence so long as the managements do not confuse the unpaid "scheduled days off" with the paid "sick-leave" and "vacation" periods.

On assembling the three chief causes of idle time, we find something like this—52 scheduled days off, 12 sick-leave days with pay and 15 vacation days with pay, 4 days for schooling, misses, etc. The total is 82 days, leaving but 283 effective working days out of 365, per man.

### Average Apparent and Effective Working Day

Of the 68 roads which furnished data, 53 or 77.9 per cent have an 8-hour day. Five roads (7.4 per cent) have a shorter day and 10 roads (14.7 per cent) a longer day. Four of the five roads referred to have an average only a few minutes under 8 hours, but one has a workday of but 7 hours 26 minutes. Likewise part of the 10 longer-time roads exceed 8 hours by only 10 or 15 minutes. In the instances of a 9-hour day, there is compensation through getting every fourth day off, while the property which attains the maximum of 9 hours 47 minutes does so because it has a 2-hour meal relief as part of the workday.

Of course, not all of the so-called working time is effective platform time. First, there are layovers at the terminals, some of which are demanded by the schedule layout and others which are granted for relief. These latter allowances were made long before the 8-hour day, but when the latter was introduced the managements did not or could not take advantage of this change to cut down non-schedule layovers.

As 22 roads did not answer the question on layovers at all, it is possible that they do not grant any. However, the 45 which did show an average layover period of 45 minutes a day.

Meal relief usually ranges from 20 to 25 minutes and counts as part of the workday.

Signing on and off, preparation of reports and the like, on 49 properties are counted as part of the workday; on 19 they are not. The average time on the 49 which pay is 14 minutes a day.

Deadheading time to and from the reporting point usually amounts to but a few minutes and appears to be paid for only on five properties. In one case the men are paid for the time required to draw their pay.

The average effective working time of 63 roads is found to be 439 minutes, or 7 hours 19 minutes.

On comparing the schedule speeds and the effective working time of the platform men, it is found that the average performance per man per annum is 26,860 km. (16,653 miles). This figure requires modification because some operators included as platform personnel men who were assigned to other transportation duties. As these non-platform men amounted to about 3.5 per cent of the total, the actual performance is 3.5 per cent better, or 27,800 km. (17,236 miles).

As previously noted, many of these railways are of cross-country or interurban character. If, then, the properties showing more than 30,000 km. (18,600 miles) per annum per man are omitted, this leaves the street railways which appear to average 21,880 km. (13,566 miles). After certain other deductions, an average of 21,000 km. (13,020 miles) is obtained.

With 283 effective working days averaging 7 hours 19 minutes, an annual total of 2,070 hours is arrived at. If the service was devoted entirely to car movement at 14.8 km. (9.18 miles) an hour, the average of all classes of roads would be 30,600 km. (18,972 miles), but actually it is only 27,800 km. (17,236 miles), a difference of 9 per cent. Part of this difference is due to layover time required by the schedule and part through payments made to men on the extra list.

# Current-Checking Means for Cars, Carhouses and Shops*

## Methods of Economizing Current Analyzed from Replies of 86 Railways —Personal Supervision Without Mechanical Devices Favored in Berlin and Hamburg—Roads Using Instruments Obtain Savings

By Wilhelm Pforr
Manager Berlin Street Railways,
Berlin, Germany

ALMOST all electric railways may be said to use more current than necessary, and the current so wasted is generally used destructively. Wastage is least on routes with long free runs, long intervals between stops and appreciable grades. Wastage is most on routes with short intervals between stops and with close headways and interference from foreign vehicles. Power saving on the latter type of railway, which includes all large cities, is an absolute necessity.

Eighty-six managements replied to a questionnaire in which they were asked to explain their ways of economizing current. Of these, 17 make no effort to save power, 26 use current-checking devices and 43 depend upon power inspectors.

Most of the railways which make no attempt to regulate current consumption belong to the free-running group already mentioned, and it is not believed that it would pay them to inaugurate such regulation. This leaves 80 per cent as the proportion of railways which carry on some form of supervision, with 50 per cent using power inspectors and 30 per cent using instruments. Of the latter class, 10 undertakings use power-on clocks, 10 use watt-hour meters, 4 use ampere-hour meters and 2 use the Wolff acceleration meter.

All users of the first three devices report a saving in energy. The Wolff acceleration meter has not been in use long enough to yield sufficient experience, but it is believed that its chief value is in protecting the electrical equipment against overload rather than in the direct saving of current. Undoubtedly, there is a saving from the use of the various devices, chiefly because the motormen believe that they are under surveillance, yet the use of such devices is not recommended by the writer, at least on large city systems, for the following reasons: (1) The appreciable expense of record-keeping personnel; (2) the maintenance cost of the instruments; (3) overloads occur oftener because the instruments tend to encourage high rates of acceleration and to discourage the series running which is so valuable in congested areas; (4) false comparisons, which are drawn frequently, cause dissatisfaction among the motormen.

For these reasons, personal supervision is preferred to the use of instruments—a practice successful today both at Berlin and Hamburg. There is no extra cost because the same men who serve as motormen-instructors, to the number of one or two per 100 motormen, are used as power inspectors. The success of the method depends largely upon selecting truly skillful men. Aside from this, the motormen should receive power-saving rewards which will be sufficiently high to interest them. It is essential that the bogey of energy consumption for each route and type of car operated should be carefully determined.

It is also desirable to tally the use of current in the carhouses and shops, since this may run from 5 to 10 per cent of the total energy. Watt-hour meters are recommended for all such situations and also for service cars. A separate meter should be used for the circuits employed in car shifting, in lighting and in shop tool operation. The results, as at Berlin, have been excellent, in stimulating competition between different stations in respect to saving power. The meters are read monthly and compared with the month immediately preceding and with the same month a year before. Supervision of traction current consumption on the basis of units per car-kilometer run is conducted on a day-to-day plan, so that the effect of loading, weather conditions, etc., may be figured and appropriate steps taken to correct apparent waste.

*Abstract of a paper before the Internationaler Strassenbahn und Kleinbahn Verein, Homburg von der Höhe, September, 1924.

### Utility Commissioners' Convention in Phoenix, Ariz., Nov. 11

PERILS of railroad grade crossings, the proper method of regulating motor vehicle transportation, rates and service of railroads and public utilities, valuation of railroads, uniform laws for regulating commissions and proposed amendments to the federal transportation act of 1920, are among the subjects scheduled for discussion at the thirty-sixth annual convention of the National Association of Railroad and Utilities Commissioners, which will meet in Phoenix, Ariz., beginning Nov. 11 and will last four days.

As one feature it is expected that an address will be delivered by Secretary of Commerce Hoover. There will also be addresses by at least one member of the Interstate Commerce Commission and several state commissioners; by former presidents of the association, including Carl D. Jackson of New York City; Walter A. Shaw of Chicago and Charles E. Elmquist of St. Paul. There will also be addresses by representatives of the railroads, gas, electric light and power and telephone companies.

### Pennsylvania Association Annual Meeting

THE annual meeting of the Pennsylvania Street Railway Association will be held at the Penn-Harris Hotel, Harrisburg, Dec. 5.

An effort is being made to have a symposium on traffic problems led by Harland Bartholomew of St. Louis and attended by directors of public safety and chiefs of police from the various cities in Pennsylvania. Other topics to be considered are bus operation and the economy of buying equipment repair parts direct from the manufacturer or making them in the railway shops.

At the evening dinner addresses will be made by prominent men in and out of the industry.

### Central Traffic Association Meeting

THE next regular meeting of the Central Electric Traffic Association will be held at the Waldorf Hotel, Toledo, Ohio, Nov 19 and 20.

The morning session on Nov. 19, beginning at 9 o'clock, Eastern time, will be in the nature of a round-table discussion, at which time matters of general association interest and particularly items to be dealt with by committees will be considered.

The afternoon session and the session on Nov. 20, will be devoted to reports of committees and other business.

### Iowa Midyear Meeting at Des Moines, Nov. 13-14

ANNOUNCEMENT is made that the midyear operating meeting of the Iowa Electric Railway Association will be held at Des Moines, Nov. 13 and 14. The following program has been arranged:

Thursday morning session:

Paper, "Track Construction and Maintenance," by N. W. Freund, Davenport.

Paper, "The automatic Substation—Its Care and Maintenance," by D. H. Nail, Des Moines.

Paper, "Bus Maintenance," by W. G. Lamb, Waterloo.

Following the morning session, a luncheon will be given through the courtesy of the Des Moines City Railway. In the afternoon there will be inspection trips over the properties of the Des Moines City Railway and Des Moines & Central Iowa Railroad. A banquet will be given in the evening at the Fort Des Moines Hotel.

Friday morning session:

Paper, subject to be selected by a manufacturer's representative.

Paper, "Maintenance of Equipment," by T. E. Wood, Omaha, Neb.

Paper, "Lubrication of Railway Motors," by C. Bethel, Westinghouse Electric & Manufacturing Company.

General discussion and election of convention committee.

## American Association News

### Committee of One Hundred

THE executive committee of the Committee of One Hundred held a meeting at the Railroad Club Oct. 28. Those present were Gen. Guy E. Tripp, chairman; H. R. Hayes, secretary and treasurer; J. N. Shannahan, S. M. Curwen, P. H. Gadsden, T. N. McCarter, Randal Morgan, F. H. Sisson, L. S. Storrs, H. L. Stuart, F. R. Coates, E. C. Faber for Barron Collier, Morris Buck for J. H. McGraw, J. W. Welsh and Labert St. Clair.

The work of the committee since its inception in 1917 was reviewed and a report of the finances was given. A general discussion ensued as to the best means of furthering publicity and dissemination of facts and statistics for electric railways, which has been done by the advertising section of the American Association in connection with the Committee of One Hundred. A general appreciation of the work being done by Mr. St. Clair as director of the advertising section was expressed.

### Comment on Foreign Report at Executive Committee Meeting

AT THE meeting of the executive committee of the American Association held at Atlantic City, on Oct. 6, a vote of thanks was passed for the work of the committee on foreign operation, consisting of J. W. Welsh, chairman; H. A. Johnson and Harry L. Brown. This was mentioned briefly in the issue of this paper for Oct. 11, page 603. In introducing the motion, J. H. Hanna, vice-president the Capital Traction Company, Washington, D. C., addressed President Budd as follows:

"Before we adjourn I would like on my own personal account to say a word of appreciation for the work of this foreign committee. I want particularly to say it now because the idea originated in your mind and you and Mr. McGraw are really responsible for it.

"I believe that the investigation and the report as rendered is about as useful a thing along the same lines you have been talking as anything I have ever seen. This bus problem is being thrown up to us all the time—the question of the bus superseding the trolley car. The great argument that these people bring forth is the fact that the bus handles the city transportation in London and other cities. I think that most of us generally have known the answer to that, but we have not had the facts. This report gives us the facts and in as clear and concise a manner as it could do. I don't know of anything that has been of more value to us in meeting that particular problem when it is brought up.

"If it is in order I would like to move a vote of thanks to that committee for the splendid work it has done."

The motion was seconded and carried.

### Metropolitan Section Meeting Scheduled for Nov. 7

A MEETING of the Metropolitan Section of the American Electric Railway Association will be held at the Engineering Societies' Building, 33 West 39th Street, New York City, Friday, Nov. 7, at 8 p.m. The outstanding event on the program will be a talk by E. F. Wickwire, chairman of the committee on co-operation with manufacturers, his subject being "Friendlyizing the Public." Music will be furnished by the Interborough quartet and a moving picture called "The Straphangers," loaned for the occasion by the Transit Commission, will be shown. In addition to the other business of the meeting, section membership pins will be distributed.

### Motor Bus Information Desired by Accountants' Committee

THE committee appointed by the American Electric Railway Accountants' Association at the recent convention at Atlantic City to draft a classification for motor bus operations is desirous of obtaining information of current practice among operating companies.

The request has been made by M. W. Glover, General Auditor West Penn Railways, Pittsburgh, Pa., chairman of the committee on bus accounting, that all companies operating motor buses forward to him a copy of the classification now in use covering motor bus operation, in order that the committee may have full information regarding all classifications now in use. Information regarding statistics which are used in connection with motor bus operations will also be appreciated.

# Maintenance of Equipment

## Convenient Buggy for Long Bars

By J. L. Rogers

Forge Shop Foreman Kansas City Railways

FREQUENTLY it is necessary to handle long bars of steel or wrought iron from stock to the forge shop, or from furnaces to hammers within the shop. Such bars are usually too heavy to be lifted by hand without excessive labor and fatigue. For handling this class of material, the simple two-wheeled buggy shown in the illustration below has proved an efficient time and labor-saving device, even though the Kansas City Railways shop is well equipped with hoists and cranes.

As shown in the illustration, the frame is made up of steel angles, riveted together. The top is made up with a number of cross-pieces that help to reinforce the framework and form a support for carrying the material. The carriage is mounted on two cast-iron wheels large enough that it may be readily moved over tracks or similar obstructions. The two top side angles are brought together and welded to the long handle. This enables the workman to manipulate the buggy with one hand while steadying the piece being transported with the other.

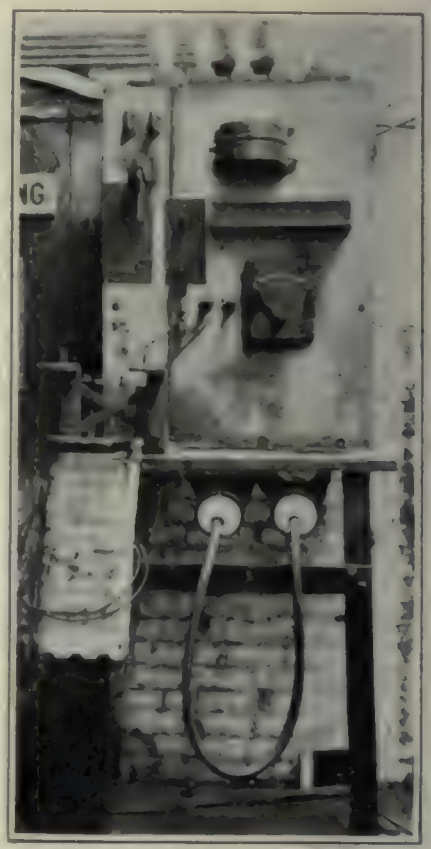
This buggy was designed of such a height that material can be pulled from the furnaces directly onto it, or can be pushed from the buggy to the bed of a steam or air hammer without lifting.



This Two-Wheeled Buggy Has Been Found Useful for Handling Long Bar Material About the Forge Shop of the Kansas City Railways

## Testing Control Jumpers

TRAIN control jumpers are tested in the Wheaton Shops of the Chicago, Aurora & Elgin Railroad by passing a current of approximately 1½ amp. through each strand and noting the continuity of the circuit by means of a small indicator lamp mounted in an annunciator box. The jumper to be tested is placed in receptacles mounted under the bench of the testing board. A 600-volt series circuit is passed through each of the conductors in turn by means of a selector switch. This was originally a motor starting switch with handle and contact points, but has been wired up for this special use. In series with each of the small conductors is a small indicator lamp located in an annunciator box and a five-lamp bank which furnishes the load to the 600-volt d.c. circuit. By moving the handle from one point to another, the various conductors in the jumper cable may be tested. Moving the jumper around while it is attached will disclose any breaks in the cable, as the small annunciator light and the lamp bank will flicker.



Control Line Jumpers Are Tested by Means of High-Voltage Series Circuit with Lamp Bank Acting as Load and Indicator Lamp in Series

Mounted on the same test board is a bracket for holding motorman's portable heaters, which are tested by means of the same lamp bank and series circuit.

## Increasing Usefulness of Air Drill

IN THE mill room of the Illinois Traction System shop at Decatur use is made of an overhead suspended air drill for drilling heavy timbers such as sills and bumpers. To facilitate the handling of the drill and air hose, they have been suspended from a carriage which travels on a swinging telfer arm. The carriage is approximately 3 ft. long and has a pulley suspended under each end. Over these pulleys

two ropes are carried, at the ends of which is the air drill and at the other the counter-balancing weight.

The carriage has four wheels similar to those used in hanging sliding doors. A rail on each side of the

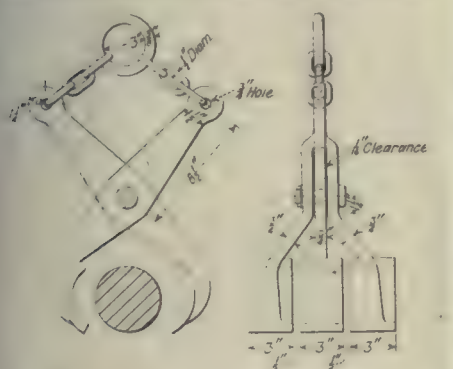


Suspending Air Drill from Traveling Carriage on Swinging Telfer Arm Increases Its Radius of Activity

telfer arm supports the wheels and carriage. This device has greatly increased the accessibility of the drill. The arm is 12 ft. long, thus making the drill available over the area of a half circle of that radius.

## Convenient Tongs for Lifting Wheels

A CONVENIENT form of tongs or shackles for lifting wheels when mounted with axles is in use in the new Hillcrest shops of the Toronto Transportation Commission, Toronto, Canada. The tongs, which resemble somewhat a pair of ice tongs, are of forged steel, with lips shaped to fit a 4½-in. diameter axle.




Lifting Shackle for Pair of Wheels and Axle

One jaw has two lips, while the other has a single one, so that the balance is the same. A short section of chain on each side connects with a 3-in. ring, so that when placed on an axle and with the crane hook in the ring, the shackle will grasp the axle automatically with no danger of its dropping while being transported by the crane. This design was worked out under the supervision of W. R. McRae, superintendent of rolling stock.

I.R.C. FORM 4915 300 4-23 PRINTED IN U.S.A.

APPARATUS RECORD

SUBJECT Rotary Converter

| | | | | | |
|---|---|---|---|---|---|
| I. R. C. No. 46 | Type H.C.C. | Form K | Scale — | Brush No. 4 | 2 |
| Mfg. G. E. Co. | Class 8-2000-375 | Capacity 2000 BKW | K. — | Quantity 118 | 42 |
| Mfg. No. 1325818 | Catalogue No — | Dr. List — | Calibrating K. — | Width 1¼ | 1½ |
| Arm No. 558818 | Volts 600 | Amps. 3334 | Calibration — | Thickness 1⅛ | 1¼ |
| Contract No. 32392 | Phase 6 | Cycles 25 | Setting — | Length 2½ | 2¼ |
| Photo. N.D #3 | Poles 8 | R. P. M. 375 | Wind'g. Spec. — | Pigtail 7" | 6" |
| Bulletins 42501-14-2 42500-14-6 | P. T. Ratio — | C. T. Ratio — | Res. — | Mfr. N.C.Co. | G.E. |
| Prints P1821609 | Reactance — | Weight 25 Tons. | Spec — | Type 255 | metite |
| Inventory N.D.D #19 | Oil No Vaculine B. | Gallons 5 Each bearing | Shunt — | | |
| Installed Nov. 1918 | Location North Division Sub. | | Position No. #1 | | |

Remarks Compound wound. Interpole.
3/12/19 Conts. tightened.
4/8/19 All Connections inspected.

Record Card for Power Apparatus

## Record Card for Power Equipment

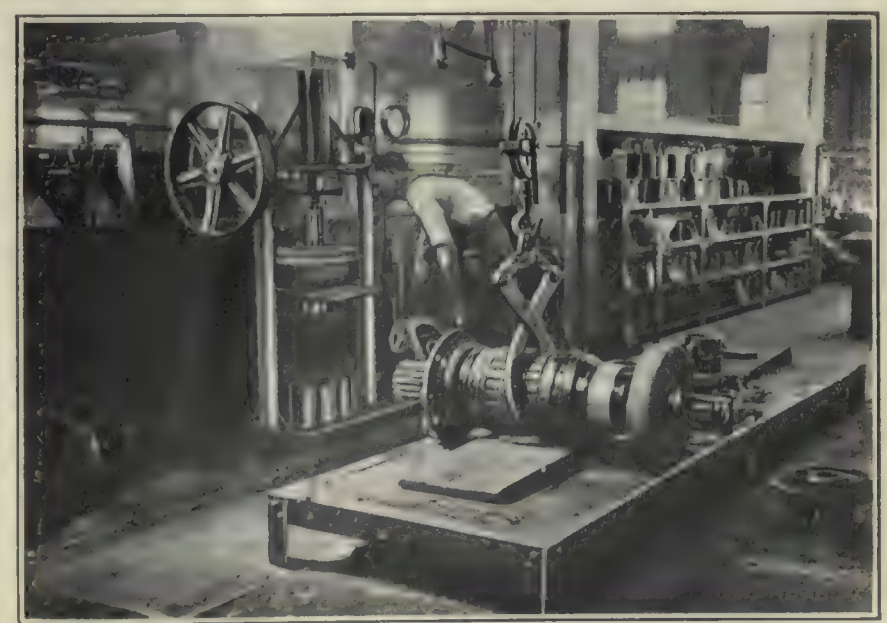
A COMPLETE record of all power equipment is kept by the International Railway, Buffalo, N. Y., on 5-in. x 8-in. cards. A special form was devised for the purpose which is both an index card for files of photographs, bulletins, blueprints, inventory records, etc., as well as an operating record card. Under the various subheads the file number of any data pertaining to the particular piece of equipment is entered.

The card is designed so that one form can be used for various types of equipment, any subhead not applying to it being crossed off. Under remarks, dates when oil was changed or filtered, commutators or rings turned, failures of any kind, painting, etc., are entered. This is continued to the reverse side of card.

## A Convenient Arrangement for Changing Bearings

ONE section of the armature room in the Snelling Avenue shops of the Twin City Rapid Transit Company is set aside and is conveniently arranged for making armature bearing changes.

At one side of this section of the shop is located the bearing press, which is a McCall Machine Works 15-ton hydraulic unit. This machine is comparatively small in size and is set up at one side of the bearing section, where it occupies the minimum amount of room and at the same time is very conveniently located relative



Overhead Hoist, Work Bench, Hydraulic Press and Storage Bins Are Conveniently Arranged for Making Bearing Changes

to the work bench and the storage bins. These storage bins allow bearings to be sorted and kept off the floor with a minimum amount of moving around on the part of the workmen. A low, substantial bench raises the armatures to a convenient height.

An electric overhead hoist is arranged so that it serves this entire section of the shop and facilitates the work of handling the armatures from storage racks to the work bench, etc. The general arrangement of the equipment for making bearing changes is shown in the accompanying illustration.

accumulations of rust from the rail and soot from the atmosphere, this is readily cleaned off with a wire brush, and when unscrewed the bolt threads show bright surfaces.

## New Equipment Available

### Stainless Steel for Third Rail Terminal Bolts

WITH the phosphor bronze and mild steel bolts used by electric railways for connecting terminals to third rails, some difficulities in removal have been found. In case of accident, when it is necessary to unscrew the bolt the threads are sometimes found fixed in the rail due to corrosion, so that considerable trouble and delay take place in removing them. With a view to overcoming this trouble, bolts made from stainless steel have been furnished to the electric railways in London by Thomas Firth & Sons, Ltd., Sheffield, England.

The bolts are used to secure the plate carrying the cable, which conveys the current from one length of the third rail to the next. Two bolts go to each plate, and the current cable is joined to these plates by means of a gunmetal holder. The bolt is threaded through the rail, and the nut is screwed up on the outer side. Threading is used in order to have a firm contact between the rail and the bolt, since the bolt is really a conductor of current. Where gun metal or mild steel bolts are used for this service it has been found that in removing the bolts, the heads are usually twisted off, which necessitates having to tap out the remaining portion.

In the sample stainless steel bolts put in service in London approximately two years ago, satisfactory results have been obtained. Although these are coated on the outside with

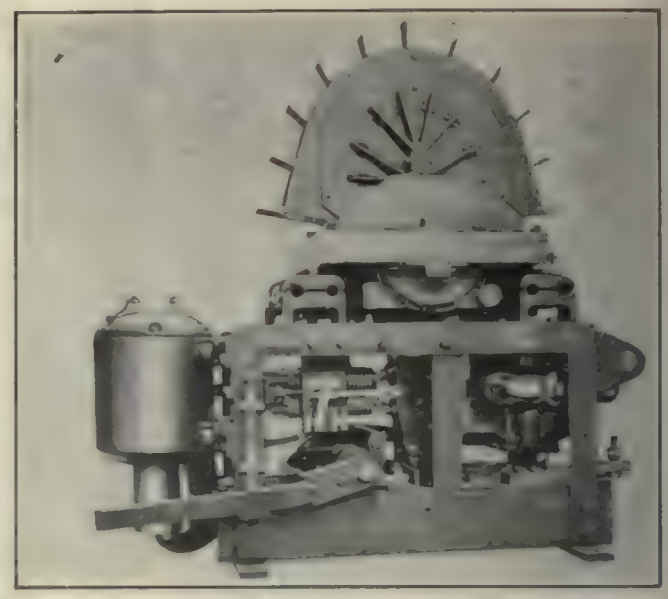
### Welding Electrode for Cast Iron

A WELDING electrode which is recommended particularly for welding cast and galvanized iron has been brought out by the General Electric Company, Schenectady, N. Y. It consists of a central metallic core surrounded by a layer of flux outside of which is a metallic sheath. The flux is thus protected from dissipation, and improved welding results. Since there is no loss of flux in transit and during welding, the correct amount is furnished the arc. On account of its stability, the arc is easy to "strike" and to "hold." Heat is concentrated at the point where it is needed and so hastens the rate of melting. The electrode can be used with alternating or direct current.

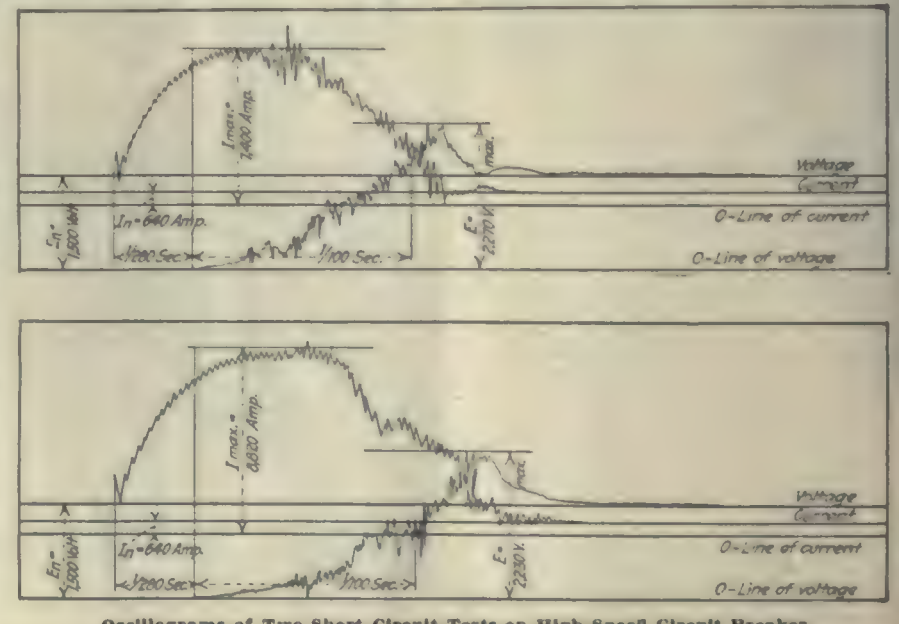
### German High-Speed Circuit Breaker

A NEW high-speed circuit breaker, which in one-sixtieth of a second will extinguish an arc rising to 9,000 amp. on 1,500-volt railway circuits, has just been manufactured by the Allgemeine Elektricitäts Gesellschaft in Berlin for the State Railways of Java. The breaker contains no specially radical features but is a development and refinement of the regular A.E.G. high-speed breaker. The accompanying illustration shows the particular breaker in question. Two oscilligrams show short-circuit tests made on this breaker.

The breaker operates to open the main circuit, but it is shunted by a resistance which, with the normal 1,500-volt circuit, will draw 640 amp. A second breaker operation then opens the circuit in another place. The breaker is a part of an order for the Javanese State Railways being furnished by the Allgemeine Elektricitäts Gesellschaft.



A.E.G. High-Speed Circuit Breaker for Javanese State Railways




Oscillograms of Two Short-Circuit Tests on High-Speed Circuit Breaker

# The News of the Industry

## Traffic Plan Suggested

**Engineers Recommend More Street Space and the Elimination of Parking**

During the past eight years ownership and use of motor vehicles in Detroit, Mich., and vicinity has increased twelve times faster than the population. This is one of the conclusions contained in a report of the survey of downtown traffic made by Daniel L. Turner and John P. Hallihan, engineers of the Rapid Transit Commission, of which Sidney D. Waldon is chairman. The report was recently submitted by the commission to acting Mayor John C. Lodge.

Their conclusion shows that at the present time 93 per cent of the total vehicular traffic passing in and out of the business district during the 12 hours consists of motor cars; only about 7 per cent are street cars, horse-drawn vehicles and other miscellaneous types. This motor car traffic is 7¼ times what it was 8 years ago.

They concluded that at all times during the day there are approximately 10,000 to 12,000 vehicles moving through the business district. The experts believe that by-pass traffic routes should be developed around the business district in order to relieve the district of the large amount of through traffic now traversing it to no useful business purpose. It was their finding that during rush hours individual automobiles carrying only 25 per cent of all passengers homeward bound utilize, roughly, 91 per cent of the traffic capacity of the streets available for passenger transportation, thereby congesting the streets and delaying 75 per cent of the passengers using the street cars and buses. They claim that the conditions attending safe movement in a congested city street do not permit attaining more than about 50 per cent of the theoretical capacity and that the traffic arteries through the business district of Detroit are rapidly approaching the saturation point. To meet these rapidly increasing traffic requirements they recommend additional street space up to the practical economic limit in order that both individual and collective traffic may be adequately accommodated and that until such relief can be attained, and afterwards to the extent that it can be furnished, collective traffic facilities should be improved, and should be given preference over individual passenger traffic during the rush.

On the subject of parking, the rapid transit engineers agreed that parking should be prohibited on street car streets and motor bus routes and other vehicles on other thoroughfares during rush hour. Parking should also be prohibited along street car and motor bus routes by segregating commercial traffic from passenger traffic during rush hours and providing special routes for such traffic and finally along street car, bus and individual motor car routes, by requiring all crossing traffic to cross at designated cross streets a number of blocks apart instead of at every crossing street, thereby reducing cross interferences, increasing the safe speed and consequently accelerating the traffic movement for both individual and collective traffic.

## Bus Issues in New York Deferred

At the regular meeting of the Board of Estimate, New York City, held on Oct. 31 the matter of the bus franchises was put over until the next meeting of the Board. It had already been put over from the meeting Oct. 29, when Mayor Hylan said that he would grant no franchises to the Third Avenue Railway unless it first surrendered its trolley franchises on 42d Street, 125th Street and some other streets. The suggestion of Comptroller Craig that the city could operate buses itself by invoking the home rule law was referred by the board to the committee of the whole and to the Corporation Counsel. Reference was made in the ELECTRIC RAILWAY JOURNAL, issue of Oct. 25 to the bus plan of the New York Railways. At the meeting of the Board of Estimate on Oct. 21 a letter was read from the receiver of the New York Railways to the effect that the company was prepared to accept a bus franchise on terms generally consistent with the report made to the Estimate Board by the Board of Transportation under date of Oct. 14, 1924. The letter stated further that the company was prepared if such borough bus franchise were granted to discuss at once the fair terms for replacement of about 46 miles of existing trolley track in Manhattan with buses.

## Seek Injunction Against Bus Line in Kansas City

The receivers for the Kansas City Railways, Kansas City, Mo., have filed a petition for injunction in the federal court against the operators of an intercity bus line to prevent its operating on the streets of Kansas City. The petition recites ordinances in both Kansas Cities, enacted some years ago to control "jitney" traffic, and which specifically bar jitneys from streets having street car tracks. The receivers, however, do not restrict their appeal to the grounds of these ordinances, outlining many other substantial reasons for prohibition of bus line operation under present conditions, without licenses, without payment of adequate or any remuneration to the cities for use of pavements, without protection to the public, with hazards to the street railways and other property.

## Traction Message Discussed

**Hearings on Chicago's Transportation Issues Consider Insull, Blair and Busby Plans**

Mayor Dever's determination to get a comprehensive transportation plan on the February primary ballots in Chicago became increasingly evident in the first week of the public hearings of the city council committee on local transportation, taking up the Mayor's recent traction message.

At the opening session, held on Oct. 27, and a subsequent one on Oct. 30, Alderman Schwartz, chairman of the committee and the Mayor's spokesman, exhibited a desire to brush aside the Insull subway proposal and learn the temper of the other aldermen on the Busby offer, a letter submitted by Leonard A. Busby, president of the South Side street car lines, proposing in effect to sell those lines to the city separately from the unified Chicago Surface Lines system.

Herein, Alderman Schwartz indicated, Mayor Dever hopes to find a wedge to get at the Surface Lines and force them to his terms by a threat to buy the south side lines, though the Busby terms were identical with those from the Surface Lines as a whole which the Mayor declared to be "impossible." Alderman Kostner, a committee member, the first openly to dispute the Mayor's conclusions, declared it would be impossible ever to buy a segment of the lines and that such a threat would be useless.

Forced by Alderman Kostner to make revelations regarding the secret bankers' purchase conferences of last summer, Alderman Schwartz disclosed for the first time just how close to a sale of Surface Lines and the Mayor came. In fact, only a matter of bookkeeping prevented the consummation of the deal. The city, he said, was willing to pay $162,000,000, the capital account of the surface lines, if the company transferred to the city its depreciation, liability and certain other cumulative funds, amounting to upward of $20,000,000. At the Surface Lines offices it was said that the Mayor's system of bookkeeping transfer would have deprived the surface lines certificate holders of anything from the sale.

The Insull plan, agreeing to build $23,000,000 worth of elevated lines into districts now unserved by rapid transportation if the city uses its $40,000,000 traction fund to build a downtown subway for elevated trains, was declared by Alderman Schwartz to be a "palliative" and no real cure for the situation.

The prospects of financing a half-billion dollar transit plant was taken up. The certificates which the city proposes to trade for the elevated and surface lines stock in the event of pur-

chase were explained from the bankers' viewpoint by Alderman Schwartz. He said that the bankers say they may sell around 94 to start but they will go up.

He said the city would pay $162,000,000 to the surface lines, $90,000,000 to the elevated and spend $217,000,000 in the first of the three construction periods for new lines. The first period of construction calls for the subway.

The Blair unification plan, a merger of elevated, surface and subway transportation into either a private or municipal corporation proposed by Henry A. Blair, president of the surface lines, will be touched upon at hearings to be held after the election.

## Seeks Operating Rights on Chicago Streets

A request for franchises from the Chicago Motor Coach Company, which has confined its operation heretofore chiefly to boulevards and parks, has been submitted to the city of Chicago providing for routes on city streets largely serving territory now exclusively held by the Surface Lines. The proposal offers the city the right to purchase nearly all the lines not included in its present boulevard system.

The coach company operates on grants from the park boards which are separate taxing bodies with powers quite different from those possessed by the city. Although disclaiming any right of the city to tax or regulate bus operation, the company recognizes the potentialities of a suit now pending between the two, and suggests that such time and expense be saved.

The coach company arranged terms satisfactory to the park boards to cover the wear on their boulevards, and now proposes to pay the city 2 per cent of its gross annual receipts from the mileage operating on the city streets, less any future taxes or fees imposed by the city on the company.

Streets are divided into lists A and B. The first is said to cover streets needed mostly for terminal turns for the boulevard lines, and a 20-year franchise for these is requested. For list B there are alternative proposals: a 20-year franchise with purchase right on three years' notice in writing, or a 10-year franchise, renewable for five years, with a purchase right on one year notice in writing at any time after the franchises have run six years.

"It is possible for the city, within a reasonable time under this plan, to enter into the business of bus or motor coach transportation as to the streets included in list B without being required to pay anything other than a fair valuation for the equipment in use on the thoroughfares covered," said James J. Condon, counsel for the motor coach company.

When the company recently began sending its buses over city streets the corporation counsel on advice of the Mayor threatened to arrest the drivers for using the city streets without a license. The company instituted suit for an injunction, which is still pending. In its proposal it now specifies that any franchises shall state that neither side surrender any of its contentions but that at the expiration of the grants the status quo be preserved.

## Bus Ordinance Proposed

### St. Louis Buses Would Pay 12 per Cent of Gross Receipts—Maximum Fare 10 Cents

A proposed ordinance providing for rigid regulation by the city of bus operation in St. Louis, Mo., was presented to the Board of Aldermen by the chairman of the legislative committee. It provides for co-ordination of the buses and street cars and has been attacked by Richard W. Meade, president and general manager of the People's Motorbus Company, now operating extensively in the city, as a sure way of preventing the people from obtaining the sort of service his company offers. The measure was prepared by C. E. Smith, consulting engineer for the city. He and E. R. Kinsey, president of the Board of Public Service, opposed bus permits recently granted to the People's Motorbus Company giving that company the right to operate their buses over 43 miles of additional streets.

Salient features of the new bill are: Payment by bus companies of 12 per cent of their gross receipts annually to the city as the aggregate of an operating tax, licenses and all other city taxes, approval by the Board of Aldermen as well as of the Board of Public Service of bus route permit, strict regulation of service and transfers from all bus lines to street cars and between all bus companies.

The present bus ordinance provides for payment of 3 per cent of the gross receipts to the city and for an annual license fee of $25 per bus.

The transfer plan is subject to approval by the State Public Service Commission. No extra fare for a transfer from a bus to the street cars will be permitted, and the bill provides: "The fare collected for each transfer ride shall be apportioned between the two portions of the ride as may be agreed to by those who furnish the rides, subject to the approval or order of lawful agencies having jurisdiction."

Another provision of the new bill is that the maximum fare of 10 cents shall be reduced if the operating income shall yield more than a reasonable return on the bone fide investment in physical property after all expenses have been paid, and that no allowance shall be made in computing investment for promotion, good will, going value or permits.

An important provision says: "It is the express purpose of the city to grant revocable permits for operation of buses to supplement street railway service, and not to duplicate or compete with such service."

Another portion of the bill declares that no permits shall be granted to a company whose principal place of business is not located in the city of St. Louis and whose property to be used in the business is taxable in some other city. The headquarters of the People's Motorbus Company are located at 585 Adelaide Avenue, University City, Mo.

The proposed ordinance provides, further, that the existing bus companies must comply with its provisions immediately if they wish to preserve the permits granted by the Board of Public Service. No permits shall be for exclusive use of any streets. This feature may become the matter for much litigation as the People's Motorbus Company contends that the permits granted it by the Board of Public Service are exclusive and constitute perpetual franchises.

## Investigation Completed—International Rejects Contributions

Representatives of the Interstate Commerce Commission and the New York State Public Service Commission have closed their joint investigation into the cause of the fatal accident on the Buffalo-Niagara Falls high-speed line at Ellicott Creek crossing Oct. 19. Four passengers were killed and upward of 450 others were injured in the rear-end collision between two three-car high-speed line interurban trains. Many are still in hospitals in Buffalo, Tonawanda and North Tonawanda with arms and legs off. Most of the passengers were from Philadelphia. They had through tickets over the Pennsylvania and International railroads.

B. C. Craig and Clyde Waldo conducted the investigation for the Interstate Commerce Commission. Representatives of both commissions refused to indicate what their reports would be, but it was intimated in the newspapers that one of the recommendations will be the installation of an electric automatic block signal system on the Buffalo-Niagara Falls high-speed line. It was stated that the cars operate under very close headway when traffic is heavy and the need for such signal system was said to have been disclosed by the investigators.

Conflicting statements were made by witnesses regarding the action of the motorman who ran the second of the wrecked trains. Several witnesses are reported to have testified that he left his post and rushed back into the first car of the second section with his hands over his head. Other witnesses are reported to have testified the motorman stuck to his post. The motorman is in a Buffalo hospital in a critical condition. The investigation was held behind closed doors and it was not revealed whether or not flagmen from the stalled first section went back to signal the onrushing second section.

President Herbert G. Tulley of the International Railway rejected a proposal made by members of the I. R. C. Co-operative Association of employees to contribute one day's pay to the company to aid in the settlement of the damage claims. Several petitions have been circulated among the employees offering to raise a fund for the company and hundreds of employees signed.

The International Railway offered to pay the expenses of friends and relative of injured passengers from Philadelphia to Buffalo and North Tonawanda hospitals in instances where friends and relatives were too poor to pay their own expenses. Many took advantage of this opportunity to come to Buffalo to visit the injured passengers. One of the passengers who died of injuries sustained in the collision was buried in Tonadanda by the International Railway.

## Weekly Pass in Oklahoma City

An unlimited number of rides may be taken by passengers on the lines of the Oklahoma Railway, Oklahoma City, who purchase a weekly pass for $1.25. The Oklahoma Corporation Commission has approved an application of the railway for permission to issue these passes as a means of increasing patronage and revenues of the company. The 8-cent fare, or two fares for 15 cents, still remains in force. The company began issuing these passes on Sunday, Oct. 26. They are good for only one passenger a trip, but are transferable. Company officials state that the passes will be more economical than the regular fare if street car patrons ride frequently.

A short trial under the recent increased fare showed that revenues of the company were only slightly increased and that patronage had fallen off as compared with the same period last year. John W. Shartel, president of the company, hopes, through the weekly pass system, to increase the number of riders and at the same time benefit people who desire to use street cars frequently. Reference to the recent fare increase was made in the ELECTRIC RAILWAY JOURNAL, issue of Oct. 11.

## Cleveland Wage Question to Go to Higher Court

Members of the street car men's union in Cleveland, Ohio, voted to appeal the decision of the Common Pleas Court, which recently ordered a rearbitration of the union's demand for a wage increase for platform employees of the Cleveland Railway. The vote of the union to carry its case to a higher court was announced as being 1,976 for the appeal and 427 against. The decision of the union to appeal the case to a higher court and not to submit to a rearbitration until the higher court has ruled on the decision of the Common Pleas Court means that the Cleveland Railway will also likely appeal that part of the decision which held that the closed shop agreement between the company and union was binding upon the company. A decision by the company on this question is expected shortly.

The Common Pleas Court nullified the first arbitration, which granted the men an increase of 12 cents an hour, on the ground of fraud. The court held that the supposedly neutral member of the arbitration board which sat last May was biased and prejudiced in favor of the union and against the Cleveland Railway.

## Bus Service in Buffalo Scheduled

Bus service in Buffalo is scheduled to start on the Delaware Avenue line Nov. 2, it was announced by R. H. Horton, vice-president of the International Bus Corporation, a subsidiary of the International Railway. The Public Service Commission granted the necessary permit to the new bus company after the City Council had voted four to one to approve the franchises on the Delaware Avenue and East-West Delavan Avenue lines. Initial service is to start with 10 double-deck buses of the Fifth Avenue type between the Terrace and Delaware Park on Delaware Avenue. As soon as additional buses are received, the International Bus Corporation will extend the service to the Buffalo-Kenmore city line, and later service will be started on the Delavan Avenue line between Niagara Street and Bailey Avenue.

A 10-cent fare will be charged on the bus lines with free transfers to connecting trolley lines. Trolley passengers receiving transfers to connecting bus lines will be charged 3 cents extra, the trolley fare being 7 cents or four tokens for 25 cents.

With buses in service on Delaware and Delavan Avenues, the International Bus Corporation will give bus service on three routes in Buffalo. The Bailey Avenue bus line has been in successful operation since last spring. The company will spend $282,000 for new single and double deck buses.

## Compromise Proposals Offered in Cincinnati

Settlement of Cincinnati's traction problem appears more likely since alternative compromise proposals respecting street paving and the guarantee clause in the proposed new franchise have been submitted by representatives of the Cincinnati Traction Company and Cincinnati Street Railway Company on one side and the city of Cincinnati, Ohio, on the other. The Mayor's traction committee will meet shortly after the election to be informed of the status of the negotiations for agreement on a new franchise. The city has been insisting that the operating company shall pay one-half the cost of repairs of the streets between the rails and 18 in. to each side. Representatives of the traction and railway companies have felt that it was too heavy a burden to place on the operating company and eventually on the car riders, since fares are the only revenue.

In the matter of the guarantee clause the company representatives have said they would sacrifice, if necessary, one-sixth of the dividend of 6 per cent on the capitalization in the effort to keep for three years initial the fare at 7½ cents or less, provided a rise in fare was not caused by an increase in wages. This was not acceptable to the city representatives. Suggested compromises states that the wages clause in the 7½-cent fare guarantee be eliminated in consideration of a modification to be made in the paving clause. Alternative proposals for a modification of the paving clause include the operating company assuming one-half the cost of repairs on streets improved during or since 1920 and the company being charged with not to exceed $25,000 in any one year for street repair.

A statement has been drawn up setting forth conditions prevailing now and for some time past and what is expected to result if a new franchise is granted; in brief, that lower fares and better service should and would supplant high fares and the present service. There would also be the substitution of one company for several.

## Sunday Pass in Pittsburgh

The Pittsburgh Railways, Pittsburgh, Pa., started the sale on Oct. 26 of a Sunday street car pass for a two months trial period which will permit of an unlimited number of rides within the first fare zone, or that area covered ordinarily by a one-token ride from the center of the city. The pass sells for 25 cents and from it any number of rides may be had. The special Sunday transfer now in use covers the same area and will not be withdrawn, but will be available for those who do not make use of the new Sunday pass.

The Sunday pass is an outgrowth of the weekly pass which the Pittsburgh Railways recently installed in Washington and McKeesport. The user on Sunday will have the same privilege for riding as is enjoyed by residents of those two communities during the week. No transfers are issued on the passes and they are not good on night cars or on interurban cars.

Under the slogan "Ride all day Sunday for 25 cents," the Pittsburgh Railways, through its commercial department, advertised its scheme broadly. The transportation department got out a special circular addressed to trainmen explaining to them how the passes would be supplied to the men on Friday of each week and that each man would be charged with ten of these passes bound in a pad. With the proceeds from the sale of these the men were to purchase additional passes, if necessary.

For the first Sunday, Oct. 26, approximately 20,000 of the 25-cent passes were sold. It is said that the 17,500 originally printed for use on that day were exhausted before noon, and 9,500 of the ones that had been printed for the following Sunday were restamped and rushed to the various carhouses to meet the demands of the patrons. William H. Boyce, commercial manager of the railways, said that the sale exceeded the company's expectations; that while the token fare receipts fell off about 40,000 during the day, travel was heavier than on the previous Sunday. According to a check-up, each buyer of a pass used the ticket for about 5 rides.

In its announcement of the installation of the pass the commercial department of the company stated that the success of the pass in the next ten Sundays would determine its adoption for future use. This is another proof of the company's efforts to improve service.

## Alleged Fraud in Seattle

Events in connection with the purchase of the Seattle Municipal Railway System, Seattle, Wash., and later probing of that transaction were testified to before the City Council's department efficiency investigating committee on Oct. 21 and Oct. 22. Witnesses went into detail in accusing prominent officials connected with the railway interests and the city of trickery, bribery, conspiracy and double dealing in their efforts to have the $15,000,000 purchase contract of the street railway lines rescinded. The Seattle papers characterized the story as a sordid one and the evidence as sensational.

# News Notes

**Will Seek Bus Charter.**—The Lehigh Valley Transit Company, Allentown, Pa., will apply on Nov. 17 for a charter for the Lehigh Valley Transportation Company, a subsidiary, for permission to operate a bus line in Northampton, Bucks and Montgomery Counties.

**Buses Barred.**—The Interstate Public Service Company, New Albany, Ind., has won its fight for elimination of bus competition. It has refused to relay tracks in connection with the rebuilding of Charlestown Avenue from Silver to Vincennes Street, alleging that it preferred giving up the franchise to going to the expense of rebuilding the trackage, in face of the bus competition, which was making the line unprofitable. Efforts to pass an ordinance to eliminate bus competition failed at first. The Indiana Public Service Commission was asked to take a hand and force the company, but the commission had no power in the matter. Later an ordinance was passed barring buses on Main, Market, Spring, Vincennes, State and Pearl Streets and on intersecting streets within a distance of 300 ft. in any direction from street railway lines.

**Franchise Rights Bought.** — The Northern Ohio Traction & Light Company, Akron, Ohio, has purchased the franchise rights of the Cleveland-Akron Bus Company for $500,000, according to dispatches from Kansas City. This purchase was referred to in the ELECTRIC RAILWAY JOURNAL of Oct. 18 in connection with the rejection by the City Commissioners of Kansas City, Kan., of the petition of the H. H. Moore Company to buy the bus line, already operated by P. H. Kennedy. The Akron purchase price does not include bus equipment. Bus rates between the two cities recently have been raised to $1.40 for a one-way trip, while the traction fare is only $1.

**Will Sell Token Carriers.**—To facilitate the handling of passengers and as an insurance against the loss of tokens the Philadelphia Rapid Transit Company's conductors will sell token carriers. The plan is for the passengers to give the conductor $1 for which they will get the current ride and the nickeled carrier containing twelve 7½-cent tokens, making thirteen rides and the carrier. The carrier is about the shape of a small pocket knife, with three spring-protected openings to accommodate four tokens each.

**Working Out Bus-Railway Problem.**—Marlboro, Mass., city officials are endeavoring to work out an arrangement so that bus lines and trolleys, even though the former are privately owned, can operate to the mutual satisfaction of both. A conference was brought about as a result of a letter sent to the Mayor of Marlboro by General Manager Henry C. Page of the Worcester Consolidated Street Railway protesting against the bus line between Marlboro and Westboro taking on passengers along the line of the street railway on the West Main Street in Marlboro. Manager Page explained to the city officials that the bus activities were affecting the business of the railway, and if it could not get the full benefit of the passenger traffic along its line it would be unable to continue operation in Marlboro.

**Council Meets, but Takes No Action.**—The City Council of Omaha, Neb., closed its recent conference, at which the Mayor and Commissioners were present, without formal action on the request of the Omaha & Council Bluffs Street Railway to be relieved of its occupation tax and paving requirement. The Council will meet again to take formal action and prepare an answer to the question of the street railway. The alternative for the traction company, if Mayor Dahlman's recommendation prevails in declining to lift occupation tax and paving requirement for 1925, will be to apply to the Nebraska Railway Commission for an increase in street railway fare. General Manager Leussler stated that total revenue passengers of the Omaha lines during the first eight months of this year were 1,811,143 fewer than in the corresponding period of last year. The ultimatum of the railway submitted to the City Council of Omaha on Sept. 17 was reviewed in the ELECTRIC RAILWAY JOURNAL of Oct. 4.

**Awaits Company's Decision.**—Union employees of the Rochester, Lockport & Buffalo Electric Railway, Rochester, N. Y., are demanding an increase of 4 cents an hour, from 53 to 57 cents, for trainmen, with proportionate increases for all other employees. The demand has been before a board of arbitration since last May. On Oct. 9 the board announced that it could reach no agreement with the two factions and was dissolved. Following the failure of arbitration, the men renewed their direct demand on the company and a conference followed, after which it was announced that General Manager Foster had taken the demands of the men under advisement and would announce his decision shortly. This action postponed a threatened tie-up.

**Studies New Type of Car.**—The Wisconsin Railroad Commission is making an investigation of a new type of one-man car, which calls for exit of passengers at the rear door. One of the commission's engineers has been sent to Washington, D. C., where two such cars have been placed in operation for experimental purposes. It is said that if the engineer's report is favorable it is likely that the commission will ask the Wisconsin electric railway companies to provide their new one-man cars with the rear-exit device.

**Proposed Fare Increase Suspended.**—The Board of Public Utility Commissioners of New Jersey issued an order on Oct. 21 suspending until Jan. 22, 1925, the proposed increase in fares on the Shore Fast Line and the Atlantic City & Suburban Railway, the two trolley systems operating between Atlantic City and points on the mainland. Both railways contend that they are not earning a fair profit on their investments.

**Will Protest Fare Petition.**—S. V. Stewart, city attorney, was instructed formally by the Helena, Mont., City Council recently to protest the action of the Helena Light & Railway Company, which seeks authority from the State Railroad and Public Service Commission to raise its fare and to avoid payment of royalty alleged to be due the city under the original franchise. The royalty, which formerly amounted to some $7,000 a year, according to city officials, has not been paid for about four years. Litigation in this connection has been pending for a long time.

**Abandoned Line to Be Revived.**—The North Hornell division of the Hornell Traction Company, Hornell, N. Y., which was abandoned last summer because the company was unable to operate the line at a profit, will be revived by the traction company under a ruling of the Public Service Commission. After a hearing held by Commissioner VanNamee, the company was granted an order to restore service temporarily, and this will be done at once. It is proposed to operate one-man cars on the line by the Hornell Traction Company.

**May End Franchise.**—As the result of a resolution sponsored at the recent meeting of the City Council of Windsor, Ont., Windsor is likely to terminate the present franchise of the Windsor, Essex & Lake Shore Railway, Kingsville. It will probably insist upon the road operating under a 5-year franchise in the future. Alderman Howell, who introduced the resolution, claimed the city was deriving no income under the present franchise, issued in 1906. The city solicitor will be asked to make a ruling in the matter.

**Allowed to Operate One-Man Cars.**—The Railroad Commission of Wisconsin has granted permission to the Northern States Power Company, Eau Claire, to operate one-man cars on its interurban line between Eau Claire and Chippewa Falls, Wis. The provision is made that two-men crews must be used when heavy traffic is anticipated as during the times of fairs and conventions.

**Will Reopen Stations.** — Following protests from residents of the affected sections, the Philadelphia Rapid Transit Company will reopen the northbound Frankford elevated stations at Berks Street, Church Street and Torresdale Avenue, closed some three weeks ago because of their poor patronage. In its Oct. 27 issue of "Service Talks," the company points out that in 1923, to pay operating costs and city rental, the average carload per trip on the "L" should have been 86 passengers, but the actual records show that there were only 56. The car-riding population of Frankford has increased but slightly since 1922 and this increase has been largely drawn from other sections of the city served by the Philadelphia Rapid Transit lines. The company now operates almost as many street cars to the Frankford district as it did before the elevated line was built. In spite of the new high-speed service, the company states, the public demands the same street car service.

# Foreign News

## The First Electrification of the French P.L.M. Railway

The first electrification project of the Paris - Lyons - Mediterranean Railway, will go into effect on the international line between Culoz and Modane, en route for Italy via the Mont Cenis tunnel. There are grades as high as 3 per cent, and sharp curves. With the heavy international traffic of passengers and freight this will be the most severe try-out of long-distance electrified trains possible in France.

The railway will purchase power for this section from the Paul Girod electric steel plant, a privately owned and operated plant, which was erected during the war and planned on lines which would enable it to supply an almost unlimited amount of excess current to meet any possible needs in these parts. This plant now has in operation seven separate hydro-electric stations.

## Trackless Trolleys for Ipswich and Darlington, England

Substitution of trackless trolleys for tramways has been decided upon by the Ipswich Town Council. An experimental trackless trolley route was very satisfactory. While traffic in Ipswich is not heavy, some of the streets are so narrow that there is not sufficient space between the track and the curb for other traffic.

Darlington Town Council has also definitely decided to substitute trackless trolleys for their tramways.

Parliamentary powers will be necessary in both cases.

## Station Improvements in London

Trafalgar Square station of the Baker Street & Waterloo Railway, London, England, is being completely reconstructed. Pedestrian subways will be constructed to provide safe crossings at one of the most dangerous points in London where several main thoroughfares converge at Charing Cross. The underground railways will make a large contribution toward the cost of these subways.

In 1906, when this station was opened, it was used by less than 1,000,000 passengers. In 1923 there were 5,500,000. Four lifts formerly in use will be replaced by escalators, increasing the passenger-carrying accommodation and allowing enlargement of the booking hall. The escalator tunnel will be 90 ft. long by 22 ft. 4 in. in diameter and will have to be cut through an existing subway.

To speed up reconstruction of Oxford Circus station, work is being carried on night and day. The escalator shaft, 100 ft. long by 17 ft. in diameter, is constructed at an angle of 30 deg. The bottom end joins a chamber which rests on the westbound tunnel of the Central London Railway. The top of this tunnel had to be cut away and roofed with steel girders to take the weight of the new chamber. In order to roof over the top of the escalator shaft, which is only 4 ft. below the street surface level, and to construct the adjoining section of the new station, a network of gas, water and hydraulic power mains and high-tension electric cables had to be removed and relaid in different positions. Some of the mains are of 21, 24 and 30-in. diameter.

## New Tramway Track to Be Constructed in Edinburgh

More than a mile of tramway track is to be constructed by the Edinburgh Town Council at an estimated cost of £29,400. At present 16 of the 24 routes of the Edinburgh system operate through Princes Street, which means a car every 15 seconds in each direction during the busy periods of the day. The new track is to be constructed on George Street, a short distance north of Princes Street, and it is expected that the new track will greatly accelerate traffic.

Construction of two suburban extensions aggregating about 2 miles in length, at an estimated cost of £47,460, has also been recommended by R. S. Filcher, general manager of the tramways.

## Zürich Shows Higher Receipts

The annual report of the Zürich Municipal Railway shows an increase during 1923, as compared with 1922, of 2,195,646 passengers, or about 4½ per cent. The line was extended last year about 2½ km., and the length of track in the street now is 85.047 km., and 7.872 km. in carhouses and shops. In 1923 the system had 241 motor cars and 87 trailers. The principal operating statistics follow:

| | 1923 | 1922 |
|---|---|---|
| Car-kilometers | 11,550,356 | 11,400,343 |
| Car-miles | 7,218,972 | 7,125,214 |
| Passengers carried | 48,469,502 | 46,273,856 |
| | Francs | Francs |
| Passenger operating rev. | 11,774,656 | 11,577,076 |
| Receipts per passenger | 0.243 | 0.250 |
| Rev. from other sources | 205,231 | 197,732 |
| Gross rev. per km. of track | 275,706 | 287,896 |

## Paris Subway Power Contracts Revised

The Paris Metropolitan subway has had, ever since its inception, a contract for a portion of its electric power with the Société d'Electricité de Paris. The price was based on production costs at the central station owned by the Metropolitan Company. This station being out of date, the cost of current is admittedly higher than it should be. For this reason the Société d'Electricité, with its modern equipment, has been profiting from an arrangement which was clearly to the detriment of the subway company.

A new agreement just made will assure the subway company current from the electric company on an entirely new basis which will result in a reduced price to the municipality of Paris, which now owns the subway. The agreement is retroactive from Jan. 1, 1924. The subway company agrees to spend the saving on the current it takes from the Société d'Electricité in renewing the equipment of its own plant. The new arrangement extends until 1955.

**Saving through Electric Operation.**—Electrification of the main line railways of Great Britain would mean a saving in locomotive costs of £21,000,000 a year, was stated by Lieut.-Col. E. O'Brien, electrical engineer of the London, Midland & Scottish Railway, at a meeting of the Institution of Locomotive Engineers. He said this saving would result because the electric locomotive is capable of double the mileage of the steam locomotive and the cost of repairs is from one-third to one-seventh that of steam engines.

**Glasgow Officials Confer on Traffic Problem.**—In reply to the suggestion that the tramway routes in Glasgow, Scotland, be discontinued in the congested area and buses be used to connect the different tramway routes, a report was prepared by James Dalrymple, tramway manager. In the report he expressed the opinion that this should not be done until the results on congestion of the two new bridges erected over the River Clyde can be ascertained. These are expected to relieve congestion in a large measure. The joint committees of magistrates and the tramway department, at a meeting on Oct. 8, decided to adopt this recommendation.

**Buses Confined to Tramway Lines in Aberdeen, Scotland.**—That the tramway company was not entitled to operate motor buses beyond the limits of the tramway system was the decision in a suit brought in the Aberdeen Sheriff Court against the Aberdeen Suburban Tramways. This company was operating a number of buses, running far out into the country. Such operation was held to be illegal, as Parliament only gave them power to build, work and maintain their tramway undertaking.

**Owl Cars in Liverpool Unprofitable.**—All-night tramway service on the municipal lines of Liverpool, England, has proved so unprofitable that it is to be discontinued. Statistics furnished by the manager showed that on most trips there were no passengers or only one or two. All-night cars are operated in only a few towns in Great Britain and only by the municipalities.

**Tramway Funds Used to Relieve Tax Burden.**—£12,000 of an income tax rebate of £18,000 was transferred from the tramways department to the relief of local taxes by the Cardiff, England, Town Council. This action was taken in spite of the fact that the chairman of the Tramways committee advised the Council that the tramways department required about £145,000 for improvements, £45,000 for purchase of 25 additional cars and £100,000 for various other tramway and bus requirements.

# Financial and Corporate

## Award Increased

### Privy Council Adds $838,500 to Arbitration Price of Toronto Railway —City Cost Placed at $13,650,000

The city of Toronto will have to pay the Toronto Railway a sum of approximately $300,000 in excess of the amount awarded by the arbitrators, is the substance of the recently announced decision of the judicial committee of the Privy Council at London, England, in the Toronto Railway arbitration dispute. The appeal of the city was to decide what amount the city should pay the Toronto Railway for its property. The judgment forces the city of Toronto to pay $11,483,500 for the Toronto Railway, an increase of $838,500 over the amount as it stood before the appeal went to London, and an increase of $295,000 over the original award. In addition, the city will very likely have to pay interest at 5 per cent from Sept. 1, 1921, the date of taking over the railway.

#### CITY MUST TAKE OVER MAIN OFFICE

The final cost of the property to the city, including the award proper, the interest and city's costs will approximate $13,650,000. The Privy Council added the sum of $140,000 for the steam plant, $338,500 for batteries, $65,000 for the Sherbourne property, $170,000 for the head office building and $125,000 for the share of the cost of Don Bridge and Avenue Road subway. This made the total award, excluding interest, $11,483,500.

The judgment states that the city should take over and pay for the company's main office, and that the city should reimburse the company for the amount it was taxed on the Avenue Road subway and Don Bridge up to the date of taking over the railway plant. The properties which the company contended the city should pay for and which the city rejected totaled in value, according to the arbitrators' award, $543,500.

The Privy Council entered into the history of the arbitration and referred especially to two points raised in support of the city's appeal. First, the city contended that while in valuing certain property, particularly the rolling stock, buildings and tracks, the arbitrators had proceeded on the theory that in every case the cost of reproduction, less depreciation, must be taken, no such method should have been applied in the present case. The proper course, it had been urged on behalf of the city, was first to consider whether, having regard to the size, suitability of location and other factors, a reasonable person would reproduce these assets as part of the Toronto Railway Company's system in 1921, and if not to value them on the basis of what they would bring at a sale or in case that were impossible on a scrap basis. In the opinion of the Privy Council, this argument was wrong, the arbitrators being justified in taking reproduction cost less depreciation as a reasonable guide in valuing track and rolling stock. But it was made clear that by no means were reproduction cost, less depreciation, adopted as the only and sufficient test of value.

It was also contended on behalf of the city that the theory of reproduction at current prices could not be applied at a time when, with abnormal prices actually being present, no reasonable man would reproduce the parts. The Privy Council agreed with the arbitrators in holding that they were under no obligation to proceed on any such imaginary basis. The judgment said that at the time the valuation was made the arbitrators said prices had become fairly stabilized and in determining the actual value at that time they were entitled to have regard to prices then generally current.

On the cross-appeal of the company, the judgment disagreed with the Canadian Supreme Court concerning the arbitrators' jurisdiction regarding the valuation of certain items. It was impossible for them, the judgment says, to fix a sum without incidentally determining what items were to be included.

The judgment said that the value of the items allowed by the arbitrators, amounting to $543,500, should be restored to the award. As to the particular items ruled out by the arbitrators and which were in question in the cross-appeal, the above-mentioned money considerations were added. The cost of both appeals will have to be borne by the respective parties, according to the judicial committee.

#### INTEREST ISSUE TO GO TO OTHER COURTS

Disappointment was felt on the question of interest not being cleared up by the Privy Council. It is figured that the company will be granted this by the local courts, but it may again be the means of opening a lengthy discussion. The council agreed with the view taken by the appeal court that the general rule under which a purchaser who takes possession is charged with interest on the purchase price from that time until it is paid was well established, and had on many occasions been applied to compulsory purchases, but stated that the matter lay outside of arbitration for its enforcement.

The decision reviewed by the Privy Council was rendered on Jan. 31, 1923 by a majority of three members of the Toronto Railway board of arbitration in the long-drawn valuation case valuing the system at $12,000,000. The sessions had been held on 158 days and evidence taken totaled 5,000,000 words. Sir Adam Beck, the minority member, filed a brief dissenting report saying that he was unable to concur in the conclusion as to the method which should be adopted in ascertaining the value of the railway plant and equipment, and also dissenting from the statement of the majority as to certain of the property which the railway claimed should be valued as property required for the operation of the railway. Among the prominent engineers engaged in the case for the company were Hagenah & Ericson of Chicago, A. L. Drum of Chicago and M. E. Cooley of Ann Arbor, Mich. Jackson & Moreland of Boston were in charge of the case for the city assisted by Prof. A. S. Richey of Worcester, Mass., who valued the rolling stock. Following the appeal of the city to the first divisions court against the amount and the subsequent reduction by $543,500 the city announced its dissatisfaction again and in the fall of last year announced its intention of appealing to the Privy Council.

Since the decision of the Privy Council Toronto Railway shares have advanced to 108, an increase of 4 points. When the arbitration began the stock was sold at 70½ and after the decision was announced it went up to 94½.

It was reported after the announcement of the award that the City of Toronto will soon float an $8,000,000 loan to finance the purchase of the Toronto Railway. It was stated in the ELECTRIC RAILWAY JOURNAL, issue of Oct. 11 that a loan of about $7,000,000 was expected, to be on a competitive basis.

## New Plan of Settlement for Suburban in St. Louis

Members of the bondholders' committee of the Suburban System of the United Railways, St. Louis, Mo., have stated that a new plan of settlement for them in the reorganization has been submitted. While the details of the new plan for the Suburban has not been revealed, it is said to provide for payment in full at par and interest of the $2,000,000 consolidated first mortgage Suburban bonds, while the $4,500,000 Suburban 5s would be extended under an agreement whereby $1,000,000 of the bonds would be retired in ten years at the rate of $100,000 annually and at the end of ten years the balance of the issue would be retired at par and accrued interest. The bonds would be first lien against the Suburban properties, but would not be guaranteed by the new company.

Judge Faris in the United States District Court on Oct. 25 declined to dismiss the suit of the Suburban bondholders for a separate receivership for that property and granted the request of the city of St. Louis to be permitted to intervene in the Suburban suit. He then continued further hearing of the case until Nov. 8.

Sam B. Jeffries, counsel for the Suburban interests, at the hearing asked Judge Faris not to make any further rulings in the United Railways case. Judge Faris said he would postpone further action on the petition to consolidate all of the United Railways cases which had been set for Oct. 25.

**Files Abandonment Intention.**—The New York & Long Island Traction Company has filed a certificate in the office of the Secretary of State declaring its intention to abandon a portion of its line at Ozone Park and on Rockaway Road, Long Island.

## Portsmouth Property Cannot Share Traffic

If a proposed bus line in Portsmouth, N. H., is permitted to operate, the discontinuance of the Portsmouth Electric Railway is very likely. This was brought out at the hearing before the Public Service Commission by counsel for the Boston & Maine Railroad, owner of the Portsmouth Electric Railway on the petition of Joseph Cavarette to operate a bus line in the city of Portsmouth and between Portsmouth and Rye Center, paralleling and competing with the lines of the Portsmouth Electric Railway.

The attorney presented figures to show that the number of passengers using the cars had decreased nearly 50 per cent from 1916 to 1923, while the cost of operation in the same period, even with great economy, had increased 50 per cent, and although passenger fares in the same period increased 89 per cent, passenger revenues diminished 3 per cent, so that the operating expense per car-mile in 1923 was more than 35 cents, while the operating revenue per car-mile was only 27½ cents. He stated further that the great increase in the number of people using automobiles made it improbable that the electric line could ever be made to pay its operating expenses.

## Revision of the Richey Wage Index

The Street Railway Wage Index which is compiled monthly by Albert S. Richey will be revised in succeeding issues of this paper by a change in the weighting employed in its construction. Heretofore, the index has been weighted in accordance with the number of passenger cars operated by the various companies. In the revision, the weighting is in accordance with the number of trainmen (conductors, motormen and one-man car operators) employed by the various companies. The revised index will represent more correctly the trend of electric railway trainmen's wages, although the change is but slight, as will be noted in the following table, where the former and revised wage index numbers are shown in parallel columns for 1923 and 1924 to date:

| | 1923 | | 1924 | |
|---|---|---|---|---|
| | Former | Revised | Former | Revised |
| January | 207.4 | 207.1 | 218.9 | 217.4 |
| February | 207.3 | 207.1 | 219.0 | 217.4 |
| March | 207.3 | 206.8 | 219.0 | 217.5 |
| April | 207.3 | 207.0 | 219.1 | 217.7 |
| May | 208.2 | 209.0 | 219.3 | 217.8 |
| June | 209.6 | 212.6 | 220.4 | 220.0 |
| July | 211.8 | 213.5 | 221.4 | 220.0 |
| August | 213.7 | 216.2 | 221.4 | 220.0 |
| September | 214.7 | 216.4 | 221.4 | 220.1 |
| October | 217.5 | 216.4 | 221.9 | 220.6 |
| November | 218.2 | 216.4 | | |
| December | 218.2 | 216.4 | | |

The wage index, as revised in succeeding issues, represents, on the base of 1923 = 100, the trend of maximum hourly wages of street and interurban railway platform men of about 100 of the largest companies in the United States, weighted according to the number of men so employed. It is a part of the "Conspectus of Indexes" issued monthly by Mr. Richey, and published regularly in the Corporate and Finance Section of the fourth issue each month of the ELECTRIC RAILWAY JOURNAL.

**Purchase Negotiations Started.**—Dispatches to Toronto from New Orleans, La., state that negotiations for the purchase of the South New Orleans Railway & Light Company have been opened up with financial interests in New Orleans and New York. The price is understood to be in excess of $800,000. The line, the successor to the South New Orleans Light & Traction Company, is 6.5 miles long and connects Algiers and Gretna. E. W. Burgis is president and general manager. It is said that an agreement to take over the property will be executed as speedily as possible.

**Allowed to Destroy Cars.**—Permission was granted recently to the Trenton & Mercer County Traction Corporation by the New Jersey Board of Public Utility Commissioners to abandon four of its double-truck and nine single-truck passenger cars and to charge against the company's depreciation fund $55,000 less any salvage which may be secured in the destruction of the cars.

**Wants to Abandon Line.**—The Mauch Chunk & Lehighton Transit Corporation, Mauch Chunk, Pa., has asked permission to abandon its service between Flagstaff and Lehighton, Pa., a 12½-mile route. The company plans to substitute a bus service.

**Action on Security Issue Withheld.**—The New Jersey Board of Public Utility Commissioners has withheld action on approval of an issue of securities by the Red Bank & Keyport Railway, to be used as capital stock, until the company has obtained proper franchises to operate through all municipalities on its line. The tracks and other physical property of the applicant were purchased by Herman C. Schlicting from the Jersey Central Traction Company, which the commission authorized to discontinue operations in an order of July 12, 1923. Mr. Schlicting organized the Red Bank & Keyport Railway for the purpose of taking over the old concern's existing property, providing new cars and furnishing street railway transportation over a portion of the lines of the Jersey Central Traction Company in the northern part of Monmouth County. The application dismissed recently was for an approval of certain securities to complete the financing of the new company.

**Seeks to Discontinue Line.** — The Lykens Valley Railway, Williamstown, Pa., has petitioned the Public Service Commission to discontinue its line between Williamstown and Reinerton via Tower City because it was unable to operate profitably. At the same time an application was received from stockholders of the railway company, organized as the Williams Valley Transportation Company, seeking authority to operate buses as common carriers to replace the trolley service. The Lykens Valley Railway, which is the reorganized Lykens & Williams Valley Street Railway, is 10 miles long. The company owns 7 motor passenger cars, 3 motor service and 1 trail service car.

**Hearing on Abandonment Set.** — Hearing will be held before Public Service Commissioner Oliver C. Semple at New York Nov. 10 on the petition of the Yonkers Railroad for permission to abandon a portion of its routes and franchises in the city of Yonkers. The routes proposed to be abandoned are the Nepera Park, Elm and Walnut Street, Tuckahoe, Bronx River Road and Central Park Avenue lines.

**Hotel on Carhouse Site.** — Realty Associates and Bing & Bing, Inc., have sold the old carhouse block front on the east side of Seventh Avenue between Fiftieth and Fifty-first Streets, New York, to William and Julius Manger, owners of the Manger chain of hotels, for a twenty-story hotel building. The site of the new Manger hotel is a part of the old New York Railways carhouse block, 200x800 ft., between Sixth and Seventh Avenues, acquired last August by Realty Associates and Bing & Bing, Inc., from the Broadway & Seventh Avenue Railway.

**Preferred Stock Offered to Customers and Employees.**—The West Penn Company, Pittsburgh, Pa., through the West Penn Securities Department, Inc., is offering to its customers and employees 7 per cent cumulative preferred stock, at $94 per share. Payment may be made either in cash or on the partial-payment plan. Under this plan from 1 to 100 shares may be subscribed for by an initial payment of $6 a share and a monthly payment of $8 a share.

**Names Director.** — Benjamin H. Namm has been designated by the New York Transit Commission as a director to represent the public on the board of directors of the Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y. Major Namm's appointment fills the vacancy caused by the resignation of Travis H. Whitney, now vice-president of the corporation.

**Seeks to Purchase Railway Stock.**—The Niagara, Lockport & Ontario Power Company presented a petition to the New York Public Service Commission on Oct. 27 asking for consent to purchase all of the issued and outstanding capital stock of the Warren & Jamestown Street Railway, which runs between the Borough of Warren, Warren County, Pennsylvania, and the city of Jamestown. The stock of the railroad is owned by the Venango Public Service Corporation of Pennsylvania. The petition states that the company could furnish motive power to the railroad either directly or through its subsidiary, the Western New York Electric Company, and could effect economies by using the existing transmission lines of the railroad for the distribution of electricity for light, heat and power.

**Income Increases.**—For the first nine months of the present year the Washington Railway & Electric Company, Washington, D. C., had net income of $743,487, while during the same period in 1923 the income was $588,456. Operating revenues declined from $3,726,794 in the period of 1923 to $3,550,968 for the nine months' period of the current year. Expenses also decreased from $3,075,664 in 1923 to $2,840,772 in the nine months of the current year.

**Vote to Sell Power Plant.**—Directors of the Holyoke Street Railway, Holyoke, Mass., voted unanimously Oct. 28 to sell its power plant on the Connecticut River bank to the Turners Falls Power & Electric Company and make contracts for energy for operating the electric railway system. The sale price is said to be $400,000. The stockholders will meet Nov. 18 to take action on the plan. The reported sale of the power house was referred to in the ELECTRIC RAILWAY JOURNAL, issue of Oct. 25.

**Orders Properties Sold to Cities.**—Municipal ownership of car lines in De Kalb and Sycamore, Ill., is assured by an order entered by Judge Fulton in the De Kalb County Circuit Court authorizing A. D. Mackie, receiver for the De Kalb-Sycamore & Interurban Traction Company, to sell the properties to each city. The line between the two cities will be abandoned, being unprofitable.

# Legal Notes

CALIFORNIA.—*Instruction on Last Clear Chance Doctrine.*

Instruction by the court in a "last clear chance" case that the company was liable if the motorman knew or should have known, by facts which would ordinarily come within the observation of an ordinary, reasonably careful man, that the plaintiff was lying on the track, when actually the motorman had his head to one side and was looking over his right shoulder, was held erroneous. (Alcamizi vs. Market Street Railway. 228 Pacific Rep., 410.)

CALIFORNIA. — *Land Conveyed for a Public Highway May Be Used for that Purpose to the Extent that the Convenience and Welfare of the Public May Demand.*

The State Highway Commission of California purchased a strip of land for a public highway and later instructed an interurban railway to relocate its tracks so that they would occupy the strip thus purchased. The seller of the land then brought suit against the railway for the wrongful taking of his property, making several complaints. The court held, however, that where land is conveyed for a public highway, the implication must be that it will be used as the convenience and welfare of the public may demand, and that the kind of use may change as the demand is augmented by the increase of population. An abutting property owner is not entitled to compensation anew for every improvement in the street or type of vehicle used on it or with every change made imperative with such an improvement, especially where, as in this case, the conveyance with knowledge that such a change would probably be made. [Calopy vs. United Railroads of San Francisco, 228 Pacific Rep., 59.]

FEDERAL COURT. — *Powers of City in Contracting the Purchase of Street Railway Limited by Enabling Statute.*

The city of Seattle agreed to take over the railway system in that city on Feb. 10, 1919, free and clear of every incumbrance for the sum of $15,000,000, to be paid in the way specified in the contract and this contract was ratified by the City Council. The actual transfer was not made until March 31, 1919, owing, at least in part, to the suit of a taxpayer to enjoin the sale, but this plea was denied. In the meantime, state, county and municipal taxes, amounting to $401,017, became a lien on the property on March 15. In view of this fact, the company and city agreed that the former would assume one-quarter of these taxes and the latter the remaining three-quarters. The court held, however, that the power of the city in making the purchase was limited by the statute to the plan adopted, which did not provide for payment of any taxes by the city, and that whatever legal rights the company might have against the city on the contract for repayment of taxes do not permit it to impose a lien on the property for this payment. Its payment of the tax, to avoid a sale of other property, did not entitle it to subrogation of the tax lien on the property conveyed. [Puget Sound Power & Light Co. vs. City of Seattle, 300 Federal Rep., 441 and 443 (two cases).]

LOUISIANA.—*Grant of Land on Condition of Construction of Railroad Not Defeated When Railroad Is Discontinued.*

A property owner sold certain land to another on condition that an electric railway should be built alongside the property within 16 months. The road was built, operated continuously for about four years and intermittently for another year, and was then discontinued and the rails taken up. A suit was brought to determine whether the heirs of the original owner had a reversionary interest in the property. The court held that the agreement required the construction of the line, not its operation for any definite length of time, and that the title was valid in spite of the abandonment of the line. [Bush vs. Bolton et al., 100 Southern Rep., 692.]

NEW JERSEY.—*Street Car Lines Asking Protection Against Unjust Competition and Municipal Authorities Giving that Protection Not Liable for Damages Unless Actuated by Improper Motives.*

Two suits for damages were brought by jitney operators on the charge that the defendant railway company conspired with public officials and carried on a campaign of libel, malicious prosecution and conspiracy to destroy the plaintiffs' business. The court pointed out, however, that the railway owed to its stockholders the duty of securing all legal protection against unjust and unlawful competition. It also said that the public authorities are the custodians of the public highways in many respects and must stand for the protection of the rights of the public therein. The public is interested to see that transportation on these highways is efficient, responsible and supplied at the lowest cost. The public authorities are also interested in the protection of the highways against unreasonable use. There was nothing, in the opinion of the court, to indicate that the authorities had improper motives in enforcing the ordinances complained of, and a new trial was denied. [Kelly vs. Morris County Traction Co. et. al., also Seldney vs. same 126 Atlantic Rep., 24.]

OHIO.—*Waiver of Stockholders' Liability for Corporate Debts Valid and Effective as to Stockholders in a Successor Consolidated Company.*

Up to 1903 stockholders in Ohio companies were liable for the debts of the corporation to the extent of their stock and also for an amount equal to the stock held. In 1900 the Southern Ohio Traction Company issued bonds containing a waiver of such individual liability, and in 1902 the company was consolidated with another to constitute a third corporation. In 1916 the company became insolvent, and the bondholders of the Southern Ohio Traction Company brought suit against the stockholders of the consolidated company for their interest and principal. The court held, however, that the waiver was valid and applied also to the stockholders in the successor consolidated company. [Marfield vs. Cincinnati, D. & T. Traction Co., et al., 144 Northeast Rep., 689.]

RHODE ISLAND.—*Status of Attorney for Minor Claimant.*

A claimant, eighteen years old, had an agreement with an attorney to pay him one-third of damages recovered from a railway company but later made a direct settlement with the company, and the attorney sued the railway under the "attorney's lien law." A defense was that contracts with minors are voidable, but the court held that the question whether the attorney had a contract, whether his services were necessary and the value of his services before they were repudiated, should be determined by a jury. (Jacobs vs. United Electric Railways, 125 Atlantic Rep., 286.)

WASHINGTON. — *Overhang of Cars on Curves. Last Clear Chance.*

While a pedestrian is guilty of contributory negligence if he places himself in danger from the overhang of an ordinary street car as it rounds a curve, he is not thus guilty if the car extends over the sidewalk to a much greater extent than an ordinary car. The "last clear chance" doctrine applies where plaintiff's negligence continues up to the time of injury, if the defendant actually sees the peril, or if the plaintiff's negligence has terminated and the defendant did not actually see the peril but by exercise of reasonable care should have seen it. (Leftridge, et al vs. City of Seattle. 228 Pacific Rep., 302.)

# Personal Items

## Celebrate Subway Birthday

**Twentieth Anniversary Commemorated by a Dinner to Honor President Hedley**

The New York subway has so passed into the realm of accepted things that it is hard to realize the system is only 20 years old. Yet passengers were carried for the first time on Oct. 27, 1904. Trains began running at 7 p.m. on that day, and up to midnight 111,881 tickets were sold. The proceeds, $5,594.05, were turned over by the Interborough to charity the next day.

These and other facts relating to the early history of the Interborough Rapid Transit Company were recalled on Oct. 27, when a complimentary dinner to honor Frank Hedley, president of the company, and commemorate the twentieth anniversary of the subway was given at the Hotel Commodore. About 600 men prominent in railroad, financial and business circles were present.



Frank Hedley

The fittings of the dining room were appropriate to the railroad aspects of the meeting. The waiters wore the standard caps of Interborough guards. Every table carried a railroad lantern, either red or green, and over the speakers' table was a full-sized front vestibule of a standard car with markers and destination signs. Entrance to the dining room was possible only through one of four standard turnstiles of the Interborough, in which a nickel had to be dropped. Later this nickel was returned with a German 1,000-mark bill inside a souvenir bill case with the statement: "The New York Subways always have returned to every customer more than full value for every nickel received."

In the reception room were shown the spade with which the first dirt was removed for the building of the subway, the pick and crowbar probably used when ground was officially opened, and a silvered spike driven in the early days to commemorate the completion of the subway.

William G. Besler, president Central Railroad of New Jersey, officiated as toastmaster at the dinner, and after the repast August Belmont, long president of the Interborough, told about the early trials of the undertaking and how Mr. Hedley was selected for his job. Mr. Belmont said in part:

> Thirty-four years ago I became interested in the ownership of the Kings County Elevated road, which was subsequently sold to the B. R. T., and while we owned it Mr. Hedley was in our employ. He then went to Chicago and was doing good work out there in rapid transit when we needed him here to run our subways. He has been with the company ever since. Even London, whose transit system needed badly somebody to untangle it, could not induce Mr. Hedley to desert his task of perfecting New York's subway system. On Sept 7 of next year I shall have been fifty years in the financial world as a director of various enterprises. In that length of time one gets to know men. In all my career I have never known a man more devoted to his work than Mr. Hedley. The operation of the subway is his sole work and great ambition. The day will come when New York will realize the debt of gratitude it owes to Frank Hedley.

Dr. J. Duncan Spaeth, professor of English at Princeton University, cited the guest of the evening as one who had been able to transform promise into performance and spoke of the benefit of rapid transit by which workmen were able to have more time at home instead of spending it in transportation. He referred humorously to the crowds during the rush hour, but said that it was the greatest tribute to the popularity of anything that more was wanted than could be given. He referred to Mr. Hedley as coming from a family prominent in past years in transportation and paid a marked tribute to the engineering type of mind because of its ability to control the forces of nature. In his opinion, the greatest need today is a reconciliation and coordination of technical power, financial power and political power.

Neal O'Hara of the editorial staff of the New York *Evening World* gave a humorous talk on "Styles and Turnstiles," and there were recitations and singing, led from the platform of the model car over the speakers' table.

The evening concluded with the presentation of a reel of moving pictures showing Mr. Hedley on his "farm" at Green's Farms in Connecticut, where he gets rest by performing the manifold duties of farm life.

Mr. Hedley said that when the subway was opened many people, even many railway men, doubted the practical possibility of transporting people underground. He said that Mr. Belmont was the real father of subway construction and operation in New York and deserved the largest share of credit for making the subway possible. He also spoke of Mr. Bryan, Mr. Shonts, his own assistants and the loyalty of the employees, which had made the undertaking possible. He said that his work in connection with the subways had been a great pleasure to him. He hoped he had given service to the public. This had been his intention in the past and would be in the future.

## President Robert Resigns

**Head of Montreal Property Resigns After Fourteen Years to Look After Other Interests**

E. A. Robert, president of the Montreal Tramways since 1910, has resigned. When Mr. Robert took office the old franchise of the Montreal Street Railway with the city of Montreal was drawing to a close. It became necessary to draw up a new contract. After prolonged negotiations with the civic and provincial authorities, he finally secured a franchise by which the company was guaranteed a reasonable return on its investment while the development of the system was assured. Under this agreement a Tramways Commission was appointed, to fix the fares so as to give the necessary income to the company and protect the public. At the same time the commission has to decide on the extensions that are necessary and whether or not the demands of the city are commercially practicable. In other words, while the company is still a privately owned one, the system is practically under municipal control, with the important provision that the city practically assumes responsibility for the financial success of the system. This franchise has worked to the satisfaction of both the public and the company and has been one of the models for study by street railways elsewhere that were beset in a similar manner.



E. A. Robert

The growth of the Montreal Tramways system under the presidency of Mr. Robert is shown by the fact that when he assumed control fourteen years ago the company was then operating less than 600 cars, nearly all of which were single-truck cars. Today more than 1,200 of the latest model double-truck cars are in use, including many trailers, while the trackage has been increased 50 per cent. In 1912 the number of passengers carried was 210,000,000, while last year the number was 290,000,000. The gross earnings

under Mr. Robert's management increased from around $6,500,000 in 1912 to more than $12,500,000 last year.

In addition Mr. Robert authorized the construction of several new carhouses and installed an emergency steam plant, which has proved of great benefit when there have been temporary dislocations of the regular supply of electric power for operating the cars.

The system is now reaching out to every part of the island of Montreal, and today in many parts of the city improvements are being carried out which were authorized by Mr. Robert previous to his retirement.

Mr. Robert came into prominence in Montreal about 1904 by his application to the Quebec Legislature for a charter to develop a small water power at St. Timothee, near Montreal. This charter he secured after an able and energetic fight. Despite opposition, Mr. Robert was able to finance the project, and he successfully developed the plant, which began to generate power in the latter part of 1911. This was followed by the absorption of several small power companies on the island. He extended his operations in the suburbs of Montreal, and so successful was this undertaking that he was granted rights to enter Montreal proper and thus establish a competitive source of supply.

While Mr. Robert has retired from the traction and power companies he built up, he has not retired from active business life, as his numerous personal interests are sufficient to keep him busy. Furthermore, according to reports he is working on a power proposition which will entail the development of a power plant of at least 200,000 hp., situated within 35 miles of Montreal.

This is only part of the whole story. Moreover, it is only part of the story of his achievement at Montreal. His career was reviewed in the ELECTRIC RAILWAY JOURNAL, issue of April 29, 1922. At that time Mr. Robert had just been elected president of the Quebec Railway, Light, Heat & Power Company in addition to the Montreal post and his other affiliations.

---

**T. F. Mueller,** formerly assistant business manager of ELECTRIC RAILWAY JOURNAL and *Bus Transportation*, has been made district manager for the states of Michigan and Indiana, effective Nov. 1, with headquarters in Detroit. Mr. Mueller has been connected with the business department of this paper since January, 1917.

**Gen. W. W. Atterbury** vice-president of the Pennsylvania Railroad, will become president of the road when President Samuel Rea retires next year. In preparation for this change General Atterbury was moved up on Oct. 29 from his position of vice-president in charge of operation to that of vice-president. It is said among shippers that he knows their business requirements almost as well as he knows the needs of the railroad. He worked himself up from his first job as an apprentice in the Altoona shops of the Pennsylvania Railroad to the president of the American Railway Association in 1916. From August, 1917, to May, 1919, he was director general of transportation of the A. E. F. in France with the rank of Brigadier-General.

## Posts of Superintendent of Personnel and of Instruction Filled at Detroit

Two new positions were created on Oct. 1 in the general staff of the transportation division of the Department of Street Railways at Detroit.

Richard Dawson was appointed superintendent of personnel and Herman B. Kirchoff was made superintendent of instruction. Both have been division superintendents for several years. They are directly under E. S. Rider, superintendent of transportation. Their headquarters are at the general offices.

Mr. Dawson will be in charge of matters pertaining to the welfare and conduct of the trainmen. He will relieve Mr. Rider and D. A. Smith, assistant superintendent of transportation, of considerable detail in connection with employees called to the main office as he will sit as chairman of the trial board which hears cases involving the platform men.

Mr. Kirchoff will supervise the work of instruction of new trainmen and of those others who require special instructions.

Of the two men, Mr. Kirchoff has been with the Detroit system the longer. His connection dates back to Sept. 14, 1895, when he started as conductor on the Fourteenth line. Mr. Dawson began as a conductor on the Fourteenth line on July 11, 1899.

Mr. Dawson has been succeeded as division superintendent of the Baker Division by Paul W. Leeson, assistant division superintendent of the Fort Division. B. L. Vail, station master at the Fort carhouse, will succeed Mr. Leeson.

Mr. Kirchoff's position as division superintendent of the Jefferson Division has been filled by promoting Charles Lighthammer, who was assistant division superintendent of that division. John Branigan, service inspector, has been appointed assistant division superintendent in Mr. Lighthammer's place.

# Obituary

## Henry J. Crowley

Henry J. Crowley, a prominent electrical engineer and general manager of the American Electric Power Company and its successor, the American Railways, since 1899, died Oct. 27 after an illness of two years. Mr. Crowley entered the employ of the Pratt & Whitney Company of Hartford, Conn., following his graduation from high school and served an apprenticeship in mechanical engineering. After completing his apprenticeship, he entered the locomotive shops of the New York, New Haven & Hartford Railroad in Hartford.

Following services with the Schuyler Electric Light Company, he entered the employ of the Thomson-Houston Electric Company and from 1890 to 1893 was manager of the railway department of the company's Southern office at Atlanta, Ga. During this period he was in charge of a number of early electric railway installations, including roads in Atlanta, Macon, Augusta and Savannah, Ga.; Birmingham and Mobile, Ala., and Chattanooga and Memphis, Tenn.

From 1893 to 1899 he was engineer and manager of the General Electric Company's railway department in the Eastern district. During this time he was actively engaged in a number of railway installations, among the more important being Philadelphia, Harrisburgh, Washington, and Richmond. When the American Railways Company was organized in 1899 Mr. Crowley was elected general manager.

Mr. Crowley was a fellow of the American Institute of Electrical Engineers and the American Society of Mechanical Engineers. He was born at Unionville, Conn., 59 years ago.

---

## C. M. Holland

On the eve of the "holing through" of the vehicular tunnel under the Hudson River between New York and Jersey City, Clifford M. Holland, chief engineer, died Oct. 27 at Battle Creek, Mich., where he had gone to recover from a nervous breakdown. He had served the city and the state of New York continuously for 18 years in designing and constructing tunnels for New York city's rapid transit subway system.

Mr. Holland was born in Somerset, Mass., in 1883. After graduation from Harvard University, with both an A.B. and a civil engineering degree in 1906, he went to New York as assistant engineer with the Rapid Transit (later the Public Service) Commission, which was then engaged on the construction of New York's subways. He remained continuously on the city's subway and tunnel work until his appointment in 1919 as chief engineer of the New York-New Jersey Bridge & Tunnel Commission, which was created to construct the great vehicular tunnel under the Hudson.

Among the important New York Subway tunnels to which he was assigned for duty were the Battery-Joraiemon Street tunnel under the East River, the Fourth Avenue subway in Brooklyn, the Whitehall-Montague Street tunnel, the Willoughby-Montague Street tunnel, the Fulton Street subway, the Old Slip-Clark Street tunnel, the Fourteenth Street-North Seventh Street tunnel, and also the Sixtieth Street tunnel.

He took a keen interest in engineering affairs and at the time of his death was a director of the American Society of Civil Engineers and president of the Harvard Engineering Society.

---

**Austin H. Pease,** vice-president and assistant treasurer of the Wason Manufacturing Company, Springfield, Mass., died in Springfield Hospital on Oct. 21, after a short illness. He was a son-in-law of the late Henry Pearson, who was president of the company under the old régime and had held the office of vice-president following its absorption by the J. G. Brill Company. After Mr. Pearson's death, about a year ago, Mr. Pease, who had been secretary, was made vice-president. He was 58 years old.

# Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

## Small Coal Consumption Reflects Business Inactivity

Correspondence reaching Washington shows that there was general surprise in the coal trade and among consumers that the country's stocks should have been 47,000,000 tons on Sept. 1, as shown by the report issued jointly by the United States Geological Survey and the Bureau of the Census. In some quarters there is a disposition to doubt the returns. Those who hesitate to accept the figures in the stock report base their attitude on the fact that production was low during April, May and June—lower than in those months of 1921—yet the stock report shows a reduction of only 15,000,000 tons since Jan. 1 and only 4,000,000 tons since June 1.

The explanation of the apparent contradiction between the production and stock figures is that consumption of coal has been at a low ebb. In fact, it had fallen to a lower point than had been realized.

The stock report presents conclusive evidence that the country has been going through a period of dull business, which almost could be characterized as a depression. In the iron and steel industry, for instance, which affects coal more than do many lighter industries, the depression has been severe. The output of pig iron in July was the lowest in any month since February, 1922. To be specific, production of pig iron in July was 1,785,000 tons. This was barely half the rate of production in July, 1923, when it was 3,678,000 tons. Even the July, 1922, production was 2,403,000 tons.

In the first quarter of the year the output of iron and steel was well up around the level of 1923, a very prosperous year, but beginning in April it began to tumble. In so far as the iron and steel industry is concerned it certainly sunk to depression levels in midsummer. It is now moving upward at an encouraging rate, but has not recovered to the point where its consumption of coal is heavy.

One of the reasons why the present period of sluggishness in business has passed without much comment is that business has been spotty. Building and certain other activities have been brisk, but the heavy industries that are the large consumers of coal have been in the doldrums. They have been conspicuously absent for some time from the coal market.

It is noticeable that the changes in coal stocks since Jan. 1 reflect closely the trend of general business. From Jan. 1 to June 1 the liquidation of stocks went on rapidly, but from June 1 to Sept. 1 it was very slow. The fact that there is a heavy reserve still to liquidate is discouraging to the producers of coal and some are counseling curtailment of production, which has been rising sharply for six weeks. There can be no doubt that this would be good business from the standpoint of the coal operator, but from the consumers' point of view it is regarded apparently as good business to continue to buy coal at present prices so as to maintain the reserve.

The stock report shows that the country's reserve of coal is comfortably large. There is no prospect of a shortage this winter unless something unforeseen should occur. It would not be in the public interest for consumers to be lulled into a false sense of security and allow their stocks to fall below the danger line. There is increasing evidence, however, that American consumers at last have learned that ample reserves above ground constitute the best insurance they can have against high prices.

The appearance of the stock report, carrying with it a great surprise for the entire trade, emphasizes anew the need for distribution statistics that are comparable, at least, with those covering production. That the demand for such figures is becoming more and more insistent is indicated by the great amount of attention given the problem as applied to all commodities at the meeting of the Eastern division of the Chamber of Commerce of the United States in Washington.

## Interstate Company Spends $586,500 for Equipment

During the twelve months ended Aug. 1, 1924, the Interstate Public Service Company, Indianapolis, Ind., expended for new equipment the sum of $586,500. Of this amount $83,500 was used for the purchase of 11 buses which have been put into operation between Indianapolis and Franklin. Ten new gondolas were purchased for $20,000. The remaining $483,000 was used for the purchase of new sleeping cars, parlor buffet dining cars, express motor trail cars, stock cars, a locomotive, box and ballast cars. References to these purchases were made in the ELECTRIC RAILWAY JOURNAL, issues of Dec. 22, 1923; June 14, July 12 and Oct. 11, 1924.

## Important Extensions at Memphis

The Memphis Street Railway, Memphis, Tenn., has spent approximately $300,000 in new construction work in addition to about $210,000 in improving existing trackage for the growth of the city during the present year. About 5,800 ft. of double track is being laid now for making the connections for the crosstown line. An additional 2,000 ft. of double track is being laid on McLemore Avenue. Another important extension to the system is that of the 5,000 ft. of double track laid along Overton Park Avenue at a cost of approximately $90,000. The company has also constructed about 4,500 ft. of storage track along Front Street. Lead tracks from Main to Front Street were laid for the expeditious handling of cars to and from the storage tracks. This project, completed during the

## ELECTRIC RAILWAY MATERIAL PRICES—OCT. 28, 1924

### Metals—New York

| | |
|---|---|
| Copper, electrolytic, cents per lb. | 13.55 |
| Lead, cents per lb. | 8.65 |
| Nickel, cents per lb. | 29.50 |
| Zinc, cents per lb. | 6.85 |
| Tin, Straits, cents per lb. | 52.75 |
| Aluminum, 98 to 99 per cent, cents per lb. | 27.10 |
| Babbitt metal, warehouse, cents per lb.: | |
| Fair grade | 60.00 |
| Commercial | 28.00 |

### Bituminous Coal

| | |
|---|---|
| Smokeless mine run, f.o.b vessel, Hampton Roads | $4.45 |
| Somerset mine run, Boston | 2.15 |
| Pittsburgh mine run, Pittsburgh | 1.875 |
| Franklin, Ill., screenings, Chicago | 1.375 |
| Central, Ill., screenings, Chicago | 1.175 |
| Kansas screenings, Kansas City | 2.00 |

### Track Materials—Pittsburgh

| | |
|---|---|
| Standard Bessemer steel rails, gross ton | $43.00 |
| Standard open hearth rails, gross ton | 43.00 |
| Railroad spikes, drive, Pittsburgh base, cents per lb. | 2.85 |
| Tie plates (flat type), cents per lb. | 2.45 |
| Angle bars, cents per lb. | 2.75 |
| Rail bolts and nuts, Pittsburgh base, cents per lb. | 8.75 |
| Steel bars, cents per lb. | 2.00 |
| Ties, white oak, Chicago, 6 in. x 8 in. x 8½ ft. | $1.45 |

### Hardware—Pittsburgh

| | |
|---|---|
| Wire nails, base per keg | 2.75 |
| Sheet iron (28 gage), cents per lb. | 3.50 |
| Sheet iron, galvanized (28 gage), cents per lb. | 4.60 |
| Galvanized barbed wire, cents per lb. | 3.45 |
| Galvanized wire, ordinary, cents per lb. | 2.50 |

### Waste—New York

| | |
|---|---|
| Waste, wool, cents per lb. | 15 |
| Waste, cotton (100 lb. bale), cents per lb.: | |
| White | 12–18 |
| Colored | 9–14 |

### Paints, Putty and Glass—New York

| | |
|---|---|
| Linseed oil (5 bbl. lots), per gal. | $1.03 |
| White lead (100 lb. keg), cents per lb. | 12.00 |
| Turpentine (bbl. lots), per gal. | $0.87 |
| Car window glass (single strength), first three brackets, A quality, discount* | 84.0% |
| Car window glass (single strength), first three brackets, B quality, discount* | 86.0% |
| Car window glass (double strength) all sizes, A quality, discount* | 85.0% |
| Putty, 100 lb. tins, cents per lb. | 4–6 |

*These prices are f.o.b. works, boxing charges extra.

### Wire—New York

| | |
|---|---|
| Copper wire base, cents per lb. | 15.625 |
| Rubber-covered wire, No. 14, per 1,000 ft. | $6.25 |
| Weatherproof wire base, cents per lb. | 17.75 |

### Paving Materials

| | |
|---|---|
| Paving stone, granite, 4x8x4, f.o.b. Chicago, dressed, per sq.yd. | $3.60 |
| Common, per sq.yd. | 2.95 |
| Wood block paving 3½, 16 treatment, N. Y., per sq.yd. | 2.67 |
| Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots f.o.b. | $51.00 |
| Crushed stone, ¾-in., carload lots, N. Y., per cu.yd. | 1.85 |
| Cement, Chicago consumers' net prices, without bags | 2.20 |
| Gravel, ¾-in., cu.yd., f.o.b. N. Y. | 2.00 |
| Sand, cu.yd., N. Y. | 1.00 |

### Old Metals—New York and Chicago

| | |
|---|---|
| Heavy copper, cents per lb. | 10.75 |
| Light copper, cents per lb. | 9.25 |
| Heavy brass, cents per lb. | 7.00 |
| Zinc, old scrap, cents per lb. | 3.875 |
| Light brass, cents per lb. | 5.50 |
| Lead, cents per lb. (heavy) | 7.50 |
| Steel car axles, Chicago, net ton | $17.25 |
| Cast iron car wheels, Chicago, gross ton | 17.75 |
| Rails (short), Chicago, gross ton | 18.25 |
| Rails (relaying), Chicago, gross ton | 26.50 |
| Machine turnings, Chicago, gross ton | 9.25 |

early part of the past summer, cost approximately $50,000. The loops on both the north and south ends of the Thomas-Florida line cost approximately $11,000, and the extension of the Florida line 1,900 ft. beyond its former terminus cost $7,000. The company also made numerous repairs on the existing tracks.

## *Rolling Stock*

**United Railways & Electric Company, Baltimore, Md.,** has put several additional one-man cars in operation. They are being used on the Preston and Carolina Streets line and probably will gradually replace the cars now in use on this line. The line has been operated with 15 two-man cars with seating capacity for 44 passengers each. Under the plan being worked out these will be replaced by 20 one-man cars with a seating capacity of 40 each.

## *Track and Line*

**Philadelphia, Pa.**—Bids were opened on Oct. 21 in the office of Director Ehlers for the second section of the Broad Street subway, 8,600 ft. in length. Patrick McGovern of New York submitted the low bid of $13,485,414, and the prices submitted were found to be about the same proportionately as for the section now under construction between Girard Avenue and Clearfield Street, 10,000 ft. in length.

**Terrell, Texas.**—Surveys have been made and right-of-way for most of the distance obtained for the proposed interurban electric railway that is to be constructed between Terrell and Tyler, about 60 miles. The projected line is being promoted by Morris Mayfield, Terrell, and associates. The route of the line is through a rich agricultural section, including a number of towns that are now remotely situated from railroad transportation. Along the route are some of the largest deposits of lignite coal to be found in Texas.

**Public Service Railway, Newark, N. J.,** has received permission from the Board of Public Utility Commissioners to relocate a portion of its road in Burlington, N. J., to conform to the proposed change in a section of Pearl Street in that city.

**Dallas Railway, Dallas, Tex.,** will extend its Belmont line four blocks over the Dallas-Denison interurban tracks and will lay a passing switch and turning track. The railway will bear half of the expense, which is estimated at about $4,000.

**Miami Beach Electric Company, Miami Beach, Fla.,** will extend the Flagler Street double-track extension to Twelfth Avenue.

**Milwaukee Electric Railway & Light Company, Milwaukee, Wis.,** has started construction of the extension of the Center Street line, which will cost approximately $100,000. The extension includes 2,440 ft. of double track and 260 ft. of single track. Heat treated cast chrome nickel steel rail, developed and produced under the formula and supervision of the company's engineering department, will be laid.

**Market Street Railway, San Francisco, Cal.,** is reconstructing the track on lower Sutter Street, Third Street and Lincoln Way at a cost of $400,000. This will be followed by the rebuilding of practically the entire San José Avenue line.

**Community Traction Company, Toledo, Ohio,** has reached an agreement whereby Sylvania Avenue will be paved as soon as possible. The company will install a concrete base into which steel ties will be set.

**Buffalo & Erie Railway, Buffalo, N. Y.,** plans to install an automatic electric block signal system on its line between Buffalo, N. Y., and Erie, Pa.

**Pacific Electric Railway, Los Angeles, Cal.,** has been granted permission to build a short line freight track connecting San Pedro, Wilmington and Long Beach. This is the second step which has been taken recently toward unifying the railroad services of the harbor. Recently the commission granted the Union Pacific System permission to enter the harbor under the consolidated railroad plan. At the intersection of the Union Pacific line and the Pacific Electric tracks an overhead crossing will be built. The expenses will be equally divided. Fourteen street crossings are to be made at grade, the entire expense to be borne by the Pacific Electric. The new line will cost an estimated amount of $163,899.

## *Power Houses, Shops and Buildings*

**Memphis Street Railway, Memphis, Tenn.,** and the Memphis Power & Light Company are having plans prepared for a large reinforced concrete warehouse to be located just north of the present carhouse.

**Detroit United Railway, Detroit, Mich.,** closed down its power houses recently, thereby releasing all of the power house equipment located at Farmington, Monroe, New Baltimore and Rochester, Mich. These four power stations were replaced by 19 1,000-kw. full automatic substations. The company is offering all of these power house equipments for sale. This is in line with the agreement which the company entered into in 1923 with the Consumers Power Company and the Detroit Edison Company for the purchase of all power necessary to operate their 600 miles of city and interurban service.

## *Trade Notes*

**Detroit Stoker Company, Detroit, Mich.,** will show full-sized underfeed stokers in operation at the Mechanical Engineering Power Show, Grand Central Palace, New York City, Dec. 1 to 6, 1924.

**Roller-Smith Company, New York, N. Y.,** announces the appointment of Charles R. Speaker, Evening Star Building, Washington, D. C., as its representative in the District of Columbia. Mr. Speaker will also handle the Roller-Smith Company's government business in the States of Maryland, Virginia, North Carolina and South Carolina.

**D. B. Dean,** after nearly 25 years service with the J. G. Brill Company, has decided to withdraw from his active duties. With this in view he has resigned as sales manager and director of the G. C. Kuhlman Car Company, to take effect about Nov. 1.

**Ohio Brass Company, Mansfield, Ohio,** has moved its Philadelphia office from the Witherspoon Building to 1404 Packard Building, Fifteenth and Chestnut Streets.

**Nichols-Lintern Company, Cleveland, Ohio,** announces the rearrangement of selling territories and appointment of the following sales representatives: A. C. Burleigh, Boston, Mass.; Pharo Engineering Company, Pittsburgh, Pa.; Jameson-Ross Company, Chicago, Ill.; F. F. Bodler, San Francisco, Cal., and A. W. Arlin, Los Angeles, Cal.

## *New Advertising Literature*

**Electric Machinery Manufacturing Company, Minneapolis, Minn.,** has issued bulletin No. 854 describing, with illustrations, synchronous motors for compressors.

**General Electric Company, Schenectady, N. Y.,** has issued a 12-page booklet bearing the designation Y-2019, describing the new type A General Electric welding electrode. Details are given on electrode construction and characteristics. Results of tests on welded cast iron specimens and deposited metal specimens are described, and oscillograms demonstrating arc stability are reproduced. Instructions for use of the electrode are supplied and specifications of the standard sizes given.

**The Travelers Insurance Company, Hartford, Conn.,** has issued a 25-page booklet on the value of group insurance. The pamphlet gives the history of group insurance, some facts about those it serves and enumerates its many rewards. How the field service men on the Travelers Insurance serve the 2,400 corporations and firms on the list of group policyholders is included in the story. The value of group insurance is summarized thus: "Group insurance benefits him who gives and him who receives! You will never cease to be gratified with its adoption."

**Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.,** has issued special publication 1707, Westinghouse Railroad Data. This pamphlet contains definite information on electrical applications on steam railroads.

**Wagner Electric Corporation, St. Louis, Mo.,** has issued Bulletin No. 140, on power transformers.

**Crouse-Hinds Company, Syracuse, N. Y.,** has issued folder No. 18 on "Imperial Floodlights and Projectors" and folder No. 19 entitled "A New Highway Law."



# *It always stops the car!*

## The Brake that Makes Every Car Safe in Every Emergency

There is a mighty big percentage in favor of the motorman who operates a car equipped with Peacock Staffless Brakes. He is always sure he can stop his car in an emergency no matter how adverse the conditions.

No load too heavy, no grade too steep for these powerful, quick-acting hand brakes. You can stop a car in the minimum distance by a turn or two of the hand wheel. It never fails, no matter how worn the brake shoes or how slack the chain. It is the most dependable hand brake made.

Yet Peacock Staffless Brakes are not expensive. First cost is small and maintenance cost practically nil. Some of these brakes have been on cars for five years and more without repairs.

***We will be glad to furnish without obligation estimate of cost of installing Peacock Brakes on either new or old cars.***



The Peacock Staffless

**National Brake Co., Inc.**
**890 Ellicott Sq., Buffalo, N. Y.**
***Canadian Representative:***
**Lyman Tube & Supply Company, Limited, Montreal, Canada**

# Bankers and Engineers


**Ford, Bacon & Davis**
Incorporated
Engineers
115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

**The J. G. White Engineering Corporation**
Engineers—Constructors
Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads
43 Exchange Place New York

**STONE & WEBSTER**
Incorporated
EXAMINATIONS REPORTS APPRAISALS
ON
INDUSTRIAL AND PUBLIC SERVICE PROPERTIES
NEW YORK BOSTON CHICAGO

**JOHN A. BEELER**
Operating, Traction and Traffic Investigations
Routing Surveys—Valuations—Operation
Management
52 Vanderbilt Ave., NEW YORK

**SANDERSON & PORTER**
ENGINEERS
REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS
RAILWAY, LIGHT and POWER PROPERTIES
CHICAGO NEW YORK SAN FRANCISCO

**A. L. DRUM & COMPANY**
*Consulting and Constructing Engineers*
VALUATION AND FINANCIAL REPORTS
RATE STUDIES FOR PRESENTATION TO PUBLIC SERVICE COMMISSIONS
CONSTRUCTION AND MANAGEMENT OF ELECTRIC RAILWAYS
230 South Clark Street, Chicago, Ill.
215 South Broad Street, Philadelphia, Pa.

**ALBERT S. RICHEY**
ELECTRIC RAILWAY ENGINEER
WORCESTER, MASSACHUSETTS
REPORTS - APPRAISALS - RATES - OPERATION - SERVICE

**ENGELHARDT W. HOLST**
*Consulting Engineer*
Appraisals, Reports, Rates, Service Investigation, Studies on Financial and Physical Rehabilitation Reorganization, Operation, Management
683 Atlantic Ave., Boston, Mass.

**JAMES E. ALLISON & CO.**
Consulting Engineers
Specializing in Utility Rate Cases and Reports to Bankers and Investors
1017 Olive St., St. Louis, Mo.

**JOE R. ONG**
Consulting Transportation Engineer
*Specializing in Traffic Problems and in Methods to Improve Service and Increase Efficiency of Operation*
PIQUA, OHIO

**STEVENS & WOOD, INC.**
Design and Construction of Power Stations
Railroad Electrification, Industrial Plants
REPORTS AND APPRAISALS
*Management and Financing of Utilities and Industrials*
Mahoning Bank Bldg., Youngstown, O.
120 Broadway, New York

**WALTER JACKSON**
*Consultant on* Fares and Motor Buses
Originator of unlimited ride, transferable weekly pass. Campaigns handled to make it a success.
143 Crary Ave., Mt. Vernon, N. Y.

**HEMPHILL & WELLS**
CONSULTING ENGINEERS
Gardner F. Wells Albert W. Hemphill
*APPRAISALS*
INVESTIGATIONS COVERING
Reorganization Management Operation Construction
43 Cedar Street, New York City

**Byllesby Engineering & Management Corporation**
208 S. La Salle Street, Chicago
New York Tacoma

**Dwight P. Robinson & Company**
Incorporated
Design and Construction of
*Electric Railways, Shops, Power Stations*
125 East 46th Street, New York
Chicago Youngstown Atlanta Philadelphia
Los Angeles Montreal Rio de Janeiro

The Most Successful Men in the Electric Railway Industry read the
ELECTRIC RAILWAY JOURNAL
Every Week

**Transmission Line and Special Crossing Structures, Catenary Bridges**

WRITE FOR OUR NEW DESCRIPTIVE CATALOG

**ARCHBOLD-BRADY CO.**

Engineers and Contractors SYRACUSE, N. Y.

DAY & ZIMMERMANN, INC.

ENGINEERS

DESIGN - CONSTRUCTION - REPORTS

VALUATIONS - MANAGEMENT

NEW YORK PHILADELPHIA CHICAGO

C. B. BUCHANAN, President — W. H. PRICE, JR., Sec'y-Treas. — JOHN F. LAYNG, Vice-President

BUCHANAN & LAYNG CORPORATION

*Engineering and Management, Construction, Financial Reports, Traffic Surveys and Equipment Maintenance*

BALTIMORE, 825 Equitable Bldg. — Phone: Hanover 2142 — NEW YORK, 49 Wall Street

HUMAN ENGINEERING

*Railway Audit and Inspection Company, Inc.*

*Fourth and Chestnut Sts., Philadelphia*

Boston, New Orleans, New York, Pittsburgh } BRANCHES { Baltimore, Chicago, Atlanta, St. Louis

Bureau of Commercial Economics, Inc.

*Industrial Engineers*

Organization • Methods • Layout and Facilities

Public and Industrial Relations

72 West Adams Street • CHICAGO

THE P. EDWARD WISH SERVICE

50 Church St. NEW YORK — *Street Railway Inspection* DETECTIVES — 131 State St. BOSTON

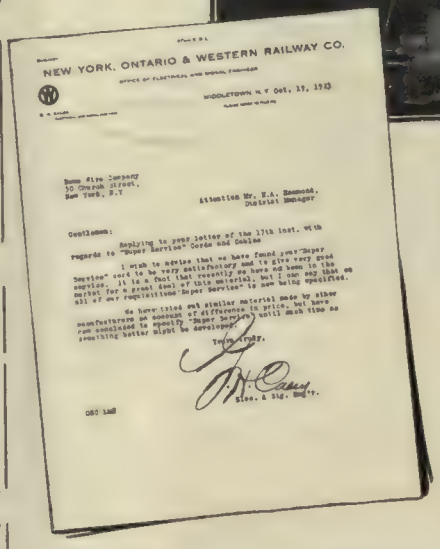
When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

The Most Successful Men in the Electric Railway Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week





NEW YORK, ONTARIO & WESTERN RAILWAY CO.

*Super Service used on repair jobs in the shops of the New York, Ontario & Western Railroad.*

All requisitions now specify "Super Service"

Read what Mr. G. H. Caley, Electrical and Signal Engineer of the Middletown Shops of the New York, Ontario and Western Railroad says of his experience with lower priced cords and cables. Now all requisitions in this shop call for Super Service because of superior results under actual use.

Super Service is a waterproof, flexible, non-kinking cord with a smooth, double walled rubber covering molded under tons of pressure. Tests in shops throughout the country have proven its value in all kinds of railway use—from portable lamps to the heaviest welding cables.

*We will gladly send you a generous sample of Super Service to test under your own conditions. You will also receive a booklet describing its construction and outlining a wide variety of money-saving uses. Write Dept. B-2.*

ROME WIRE COMPANY

*Mills and Executive Offices:* ROME, N. Y.

*Diamond Mills:* BUFFALO, N. Y.

*BRANCHES:*

NEW YORK, 50 Church St. — BOSTON, Little Bldg. — DETROIT, 25 Parsons St. — CHICAGO, 14 E. Jackson Blvd.

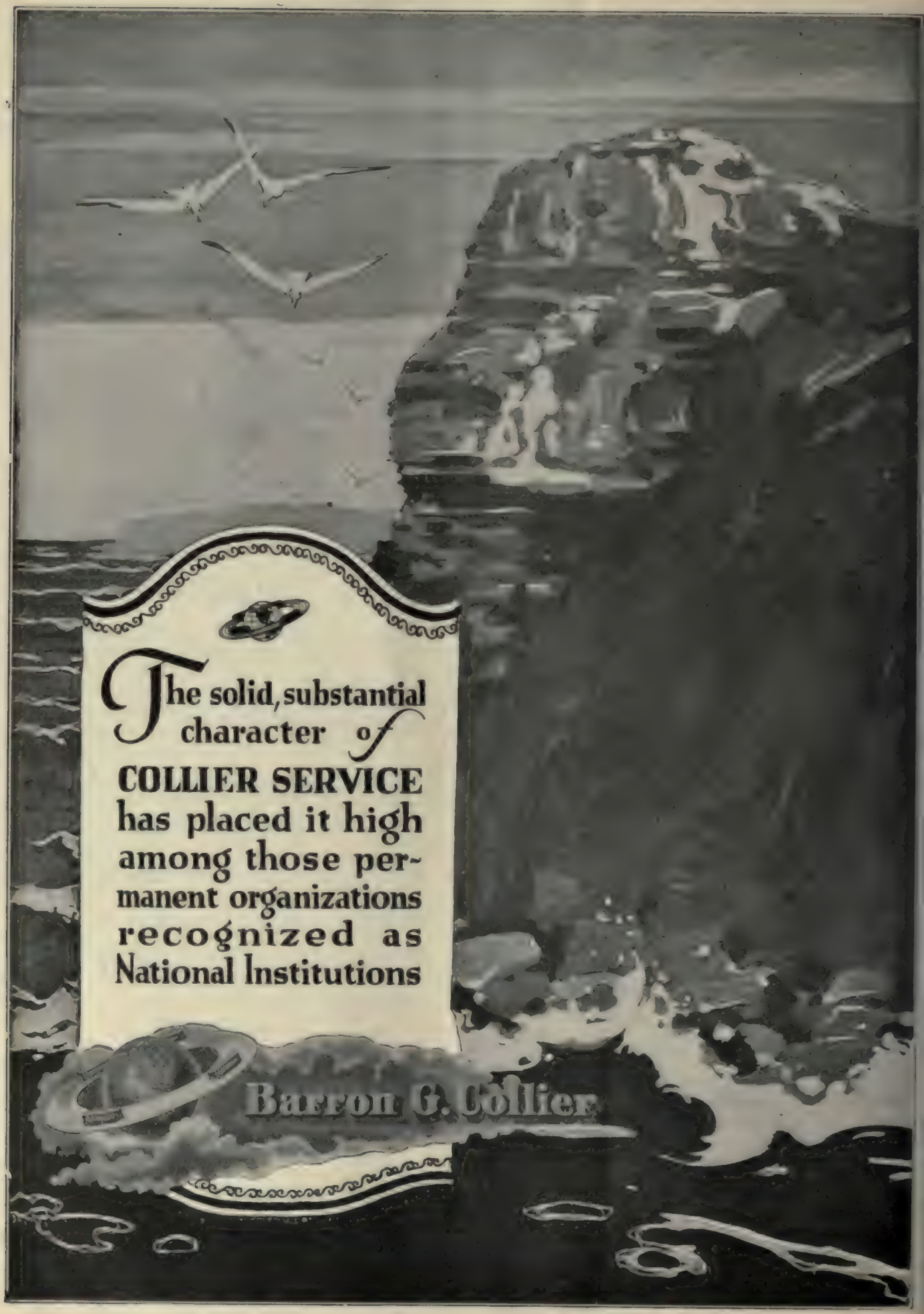
LOS ANGELES, J. O. Pomeroy, 336 Azusa Street

CLEVELAND, 1200 W. 9th Street

ROME WIRE

WIRE-ROME

2174-L


The solid, substantial character of
COLLIER SERVICE
has placed it high among those permanent organizations recognized as National Institutions
Barron G. Collier



Superior Parlor Car, mounted on Garford Chassis. This body has all the beauty and comfortable seating and riding qualities of the finest De Luxe Coach. Being of the pay-enter type it permits of profitable one man operation without lost time as the operator need never leave his seat at stops to manipulate doors or collect fares.

# Bodies Produced By Superior

Acme, Garford, International, Pierce-Arrow, Republic, White, Yellow Coach! Superior has produced bodies for all of these better known chassis during the past year. For each of them Superior has produced bodies, beautifully designed; bodies properly suited to the chassis, resulting in fine appearance.

Superior bodies have gone into all classes of service. Long haul, short haul, street car, sightseeing service. For each type of service there is a Superior body that adequately meets the demands upon it.

Superior gives to the Chassis Builder a body that is a complement to his equipment. To the Motor Coach operator, Superior gives a sturdy, safe body. A body that attracts patronage by its fine appearance and holds that patronage by giving comfortable transportation. Superior bodies, because of their sound construction, earn further good will by keeping out of the repair shop.

When thinking of Motor Coach Bodies it pays to consult Superior. Write for complete information on any type of body.

## THE SUPERIOR MOTOR COACH BODY CO.

LIMA, OHIO

SUPERIOR BODIES

# "INDIANAPOLIS"

## Is Saving Electric Railways Millions of Dollars Annually

**Don't spend a dollar on your track**
***(New or old)***
**Until you get "INDIANAPOLIS"**
**Prices for Comparison**

## "INDIANAPOLIS" Economy Products

***"They cost less"***

**Solid Manganese Crossings**
also Frogs, Mates, and Tongue-Switches
(15 years of specializing has produced a product UNEXCELLED, and LOWEST in COST, quality considered)

**Electric Welders**
Thoroly Efficient
(Economical and never out of COMMISSION)

**Welded Rail Joints**
(A COMBINATION OF EVERY ESSENTIAL FACTOR in Rail Joining and Bonding)

**Welding Steel Electrodes**
Absolutely Dependable

**Electric Welding Supplies**
Hoods, Lenses, Carbons, Etc.

**Better design**
**Higher quality**
**Longer service**
**Lower prices**

## The Indianapolis Switch & Frog Co.

SPRINGFIELD, OHIO

Los Angeles San Francisco Kansas City Boston

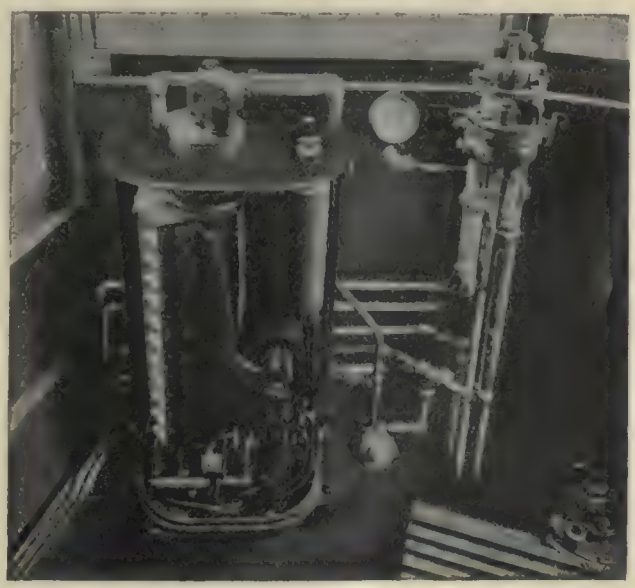
# HERE'S THE TROUBLE, and HERE'S THE CURE

"All maintenance men are familiar with the difficulties experienced with new air actuated equipment on account of scale and dirt from the new piping collecting at undesirable points. Many of these difficulties can be avoided by a careful installation of the pipe. Before pipe is assembled it should be thoroughly hammered to loosen all scale or dirt, all fins and burrs tending to restrict the opening should be cut away and the pipe should then be blown out to remove all such matter. This treatment should be given before the pipe is in place, for otherwise it is apt to result in the deposit of this matter in some part of the pipe system or in the appliances connected thereto.*"

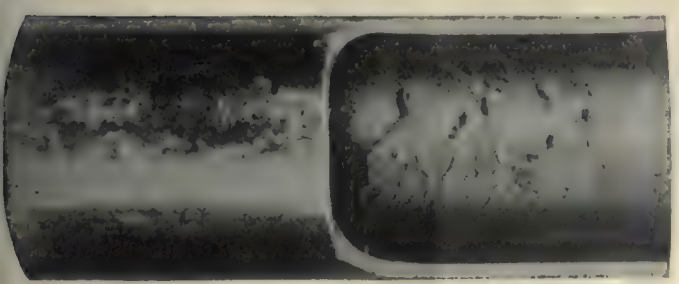
*From an article in Electric Railway Journal, by Joseph C. McCune, Westinghouse Traction Brake Co., entitled, "Installing Safety Car Control and Air Brake Equipment."*

"NATIONAL" Welding-SCALE FREE Pipe having clean, smooth surfaces both inside and out, is ideal for installations on electric railway cars, and can be depended upon to greatly reduce the troubles caused where welding-scale is present.

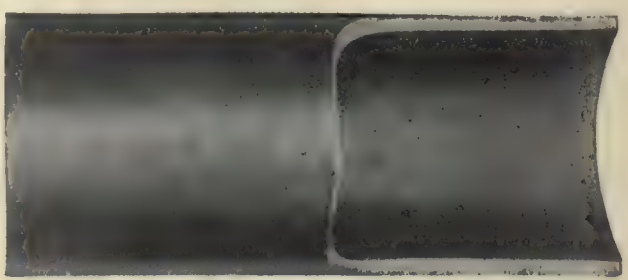
All "NATIONAL" Butt-weld Pipe, sizes ½ to 3-inch inclusive, is made by the scale-removing process. The advantages resulting are described in "NATIONAL" Bulletin No. 7—"NATIONAL" Welding SCALE - FREE Pipe—Manufacture and Advantages. Everyone interested in the installation of piping for conducting air, in any type of service, should have a copy of this Bulletin. Ask for your copy today.



*A typical installation of "NATIONAL" Welding-SCALE FREE Pipe on a modern street car.*



*Ordinary black butt-weld pipe showing chara coating of welding-scale*



*"NATIONAL" Welding-SCALE FREE Pipe, showing clean, smooth surfaces of this modern product.*

## NATIONAL TUBE COMPANY, PITTSBURGH, PA.

General Sales Offices: Frick Building

DISTRICT SALES OFFICES

Atlanta Boston Chicago Denver Detroit New Orleans New York Salt Lake City Philadelphia Pittsburgh St. Louis St. Paul

PACIFIC COAST REPRESENTATIVES: U. S. Steel Products Company San Francisco Los Angeles Portland Seattle

EXPORT REPRESENTATIVES: U. S. Steel Products Company New York City



It's a faithful worker!

And no wonder, because it's built so strong and husky. It is made of Wrought Steel—forged and rolled—a structure free from sand spots, blow holes and other irregularities. It's a safe wheel. A safe wheel of course gives good service.

Like all faithful workers, it is held in high esteem by users—the reward for constant effort to give wheel users a thoroughly reliable product.

CARNEGIE STEEL COMPANY
GENERAL OFFICES—CARNEGIE BUILDING
434 FIFTH AVENUE
PITTSBURGH, PA.

1724



# Davis "One-Wear" Wheels On the Key System

ON the inter-urban lines of the Key System Transit Company, Oakland, Cal., service is fast and equipment heavy.

Such a combination calls for wheels of the greatest possible strength and wear resistance.

Consequently Davis "One-Wear" Steel Wheels are used. Not only have they greater resistance to impact but they completely avoid the task of contour conditioning.

The Davis "One-Wear" Wheel is made of special steel compressed by centrifugal action while the metal is molten and later subjected to heat treatment to secure great strength and resistance to wear.

**American Steel Foundries**
NEW YORK CHICAGO ST. LOUIS

**DAVIS**
"ONE-WEAR"
**STEEL WHEELS**

# CHILLED IRON WHEELS

*from* 50 *foundries*

*for railway and street car service*

*Capacity 20,000 a day*

*25,000,000 in service*



THE map above shows the location of the 50 foundries in the United States and Canada represented by the Association of Manufacturers of Chilled Car Wheels.

| | |
|---|---|
| Chicago, 4 | Sayre, Pa. |
| St. Louis, 2 | Berwick, Pa. |
| Buffalo, 4 | Albany |
| Pittsburgh, 2 | Toronto |
| Cleveland, 2 | New Glasgow, N.S. |
| Amherst, N. S. | Madison, Ill. |
| Montreal | Huntington, W.Va. |
| Mich. City, Ind. | Wilmington, Del. |
| Louisville | Houston, Tex. |
| Mt. Vernon, Ill. | Hannibal, Mo. |
| Ft. Wayne, Ind. | Reading, Pa. |
| Birmingham | Baltimore |
| Atlanta | Richmond, Va. |
| Savannah | Ft. Williams, Ont. |
| Boston | St. Thomas |
| Detroit | Hamilton |
| St. Paul | Ramapo, N. Y. |
| Kansas City, Kan. | Marshall, Tex. |
| Denver | Los Angeles |
| Tacoma | Council Bluffs |
| Rochester, N. Y. | Winnipeg, Man. |

**American Railway Association Standards**

| | | |
|---|---|---|
| 650 lb. wheel | for | 60,000 Capacity Cars |
| 700 lb. wheel | for | 80,000 Capacity Cars |
| 750 lb. wheel | for | 100,000 Capacity Cars |
| 850 lb. wheel | for | 140,000 Capacity Cars |

*The Standard Wheel for Seventy-three Years*

**ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS**
1847 McCormick Bldg., Chicago



# Tooth Contour Tells

The motor coach has created, in many respects, a new field for automotive designing. It has gone far beyond the stage in which a make-shift body on a truck chassis could satisfy the operator.

Some of its needs, however, had been anticipated, among them a most important one—rear drive. The evolution of the more efficient worm type had already met the needs of a faster truck traffic on better roads and pneumatic tires.

Write for an interesting pamphlet which will give you an idea of the reasons why Timken-Detroit Worm Drive is embodied in the most advanced motor coach designs for 1925.

THE TIMKEN-DETROIT
AXLE COMPANY
Detroit, Michigan

D T A
CO

# TIMKEN AXLES






# Save the motors with Nuttall Standard Helical Gears



First, second—fifth notch on the controller, and a shock goes through the car as the motors gather speed!

That's where the trouble begins, that shock of acceleration that is inevitable with spur gearing. It springs bolts, strains bearings, loosens insulation, cuts gear life and motor life, and piles up maintenance.

Not only the motors suffer; body work suffers too, and soon begins to creak, soon needs "touching up."

Nuttall BP Helical Gears will stop this profit leak. The meshing of the teeth is like the turning of a screw—smooth, vibrationless, noiseless, shockless. There is no grinding and no chattering.

The secret lies in the 7½ deg. Helix Angle; the long and short Addendum tooth; and the famous Nuttall BP Heat Treating Process.

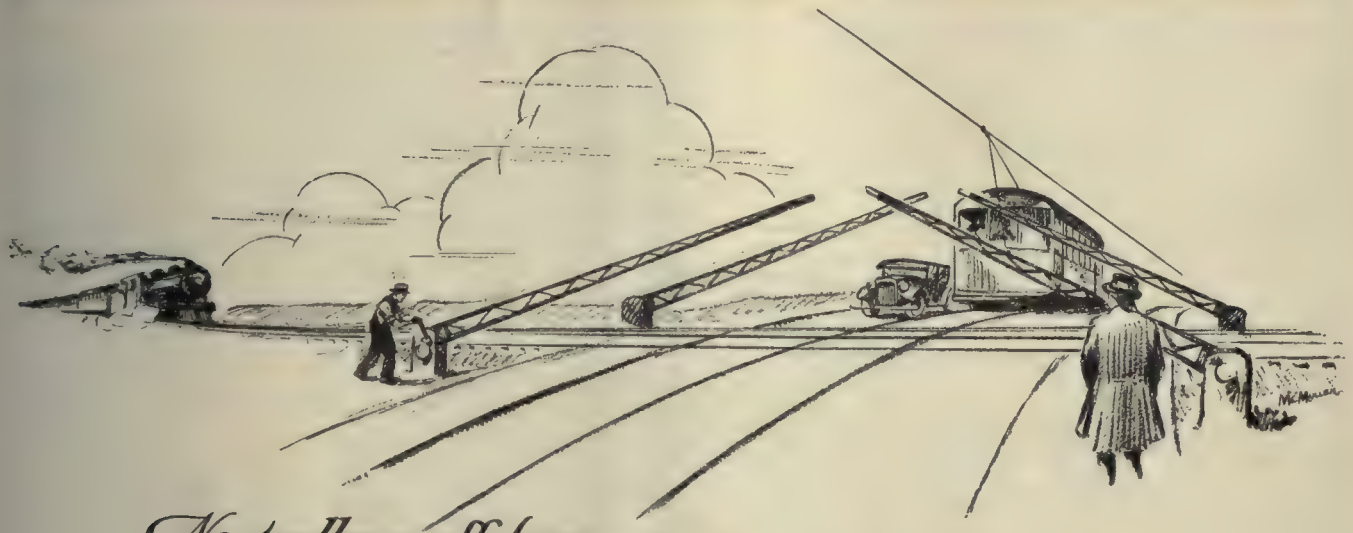
The West Penn Railways have one set of Nuttall Helicals among the many they use with a 500,000 mile record to its credit. Practically every traction property in the country is using helical gears.

We'll be glad to co-operate in *proving* their economy on your cars. Consult us.

*Write for our Helical Gear Book*

R.D. NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.




# MILLER TROLLEY SHOES

(Patented)

## cling to wire under all sorts of conditions

WHAT a feeling of security it gives, to know that trolley cars won't get stalled on steam railroad crossings. No need to wire the crossing with electrified baskets, or have a man there to replace jumping trolleys. Miller Trolley Shoes will stick to the wire here, or anywhere else.

Moreover, with a complete installation of trolley shoes, service will be improved, line breaks largely eliminated, and trolley maintenance costs materially reduced.

*Used by over fifty prominent roads!*

## MILLER TROLLEY SHOE CO.

Boston 21, Mass.

*Western Representative:*

L. E. Gould, 1590 Old Colony Bldg., Chicago




# Are you using tokens?

THE advantages of tokens over split change and paper tickets are obvious to all of the street railway companies.

If you want tokens that are difficult to counterfeit, that are accurate in size and always fit the fare boxes, that wear well and stay sharp, we can make them for you.

Next to the Government Mints, we have the largest and most complete equipment for making coin quality tokens—an organization built up in the past 104 years.

We have recently made up a sample card showing the tokens which are most popular today. May we send you one free—without obligation?

Besides tokens, we supply the railway field with cup drawn admiralty *condenser tubing* as well as ***uniform buttons.***

## SCOVILL MANUFACTURING COMPANY

**Main Office, Mills and Factories—Waterbury, Conn.**

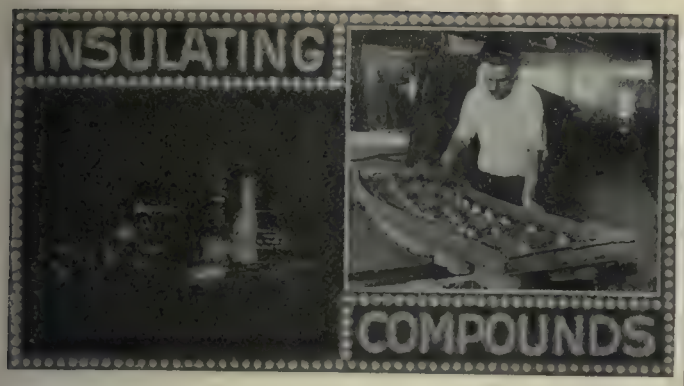
HIGHEST QUALITY—MATERIALS OF PRECISION—QUANTITY PRODUCTION

280 Broadway, New York
224 W. Lake St., Chicago
1213 W. 3rd St., Cleveland
10 High St., Boston
Penna. Bldg., Philadelphia
McGlawn-Bowen Bldg., Atlanta

ESTABLISHED 1802
SCOVILL
MANUFACTURING COMPANY

Pacific Coast Sales Agents:
Engle-Reid Co.
149 California Street,
San Francisco
Terminal Sales Bldg.,
Los Angeles

Member, Copper and Brass Research Association




"The Great White Way" to which many unique contributions have been made by the Norden Electric Sign Co., 112 E. 125th St., New York.

Behind every twinkling light, in storage batteries, "B" batteries and dry cells; in roofs, walls and floor coverings; in automobile brakes, telephones, face creams, shoe polishes—from the moment you rise in the morning until you retire at night, compounds play a vital part in life.

## MITCHELL-RAND MAKES MANY MIXTURES

In Jersey City, *"Next* to the largest City in the United States," you will find a factory in which are assembled waxes and bitumens from the four corners of the globe. Mineral waxes from Saxony, Galicia and the East Indies; vegetable waxes from Brazil, China and Japan; animal waxes from Africa and South America, pitches and asphalts from everywhere.

**Send for our special catalog on Wax, Pitch and Asphalt Compounds**

**MITCHELL-RAND MFG. CO.**
**15 Vesey St., NEW YORK, N. Y.**



## *Selma*

Selma is the smoking and snuff kit of the Kaffir — he carries it with him always.

"But how?"—you ask—"since he has no clothes suitable for pockets."

"Easy!"—we reply, for in his youth the lobes of his ears are pierced and stretched for that purpose.

And the only moral we see in this is that it is never too soon to make provision for a demand that is sure to come.

Your machines may be operating without much trouble now—but peak demand will surely come—and it is then you'll want troubleless commutation —and the one sure way to get it is with a certain top-grade brush—the name of which you can get from any of the addresses below:

## Morganite Brush Co., Inc.

***Main Office and Factory:***
***519 West 38th St., New York***

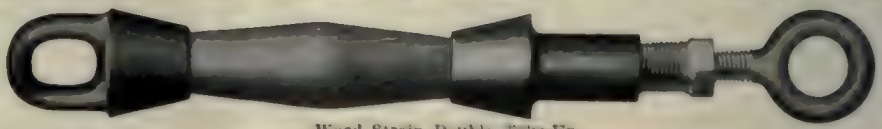
DISTRICT ENGINEERS AND AGENTS:

***Pittsburgh,*** Electrical Engineering & Mfg. Co., 909 Penn. Ave.
***Cincinnati,*** Electrical Engineering & Mfg. Co., 607 Mercantile Library Building.
***Cleveland,*** Electrical Engineering & Mfg. Co., 422 Union Building.
***Philadelphia,*** Electric Power Equipment Corp., 412 North 18th St.
***Baltimore,*** O. T. Hall, Sales Engineer, 1926 Edmondson Ave.
***Revere, Mass.,*** J. F. Drummey, 75 Pleasant Street.
***Los Angeles,*** Special Service Sales Co., 502 Delta Building.
***San Francisco,*** Special Service Sales Co., 202 Russ Building.
***Toronto, Can.,*** Railway & Power Engineering Corp., Ltd., 131 Eastern Ave.
***Montreal, Can.,*** Railway & Power Engineering Corp., Ltd., 326 Craig St., West.
***Winnipeg, Can.,*** Railway & Power Engineering Corp., Ltd., P. O. Box No. 35.

TRADE

# ANDERSON

MARK

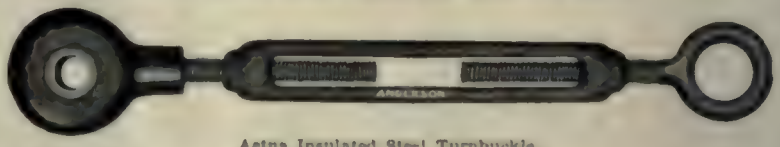


Wood Strain Double Take-Up
One turn of the bronze bushing doubles the amount of take-up.

The Double Take-Up prevents twisting the guy wire; maximum insulation is afforded, together with great tensile strength and perfect adjustment. Wood insulation 5 in.

Turnbuckles are supplied with cylindrical eye for attachment to bolt and also oval eye for use with guy wires. Made for 6-in., 9-in. and 12-in. take-up.

Brooklyn Strains are constructed with Anderson experience behind them, insulated with the well-known Aetna. Made with ⅝-in. eye, take-up 3 in.; ¾-in. eye, take-up 4 in.; 1¼-in. eye, take-up 5 in.



Aetna Insulated Steel Turnbuckle.



Single Brooklyn Strain, Aetna Insulation.

*Latest quotations gladly forwarded.*

**Albert & J. M. Anderson Manufacturing Co.**
289-305 A Street, Boston, Mass.
New York—135 Broadway Philadelphia—429 Real Estate Trust Bldg.
Chicago—105 S. Dearborn St. London, E. C. 2, 12 Moor Lane

TAYLOR-WHARTON IRON & STEEL CO.

TIOGA STEEL & IRON CO. | WM WHARTON Jr. & CO. INC. | PHILADELPHIA ROLL & MACHE



*Layout furnished Trenton & Mercer County Traction Corp.*

## Special Trackwork of Tisco Manganese Steel

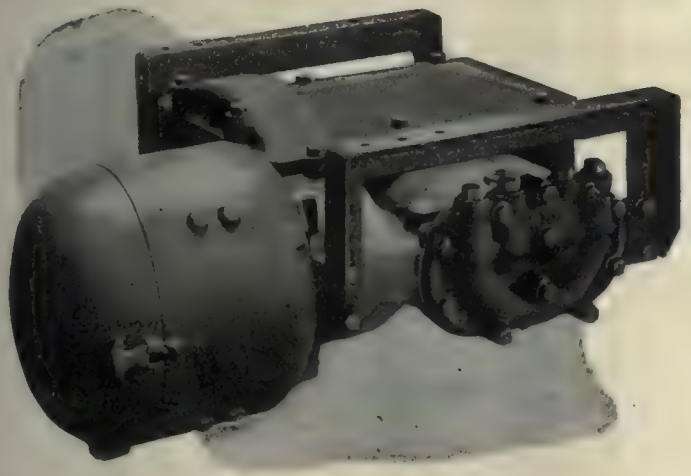
Covering a long period or years we have designed and fabricated some of the most successful trackwork in use. The adoption of Manganese Steel for trackwork was originated by this company. We are prepared to furnish special trackwork to fit any condition—switches, frogs, crossings, etc. Our engineering department is available for consultation on any difficult or unusual problem.

**Wm. Wharton Jr. & Company, Easton, Pa.**

| Taylor-Wharton Iron & Steel Co. | Wm. Wharton Jr. & Co. | Tioga Steel & Iron Co. | Phila. Roll & Machine Co. |
|---|---|---|---|
| Plant at High Bridge, N. J. | Plant at Easton, Pa. | Plant at Philadelphia, Pa. | Plant at Philadelphia, Pa. |
| Manganese Steel Wearing Parts | Special Trackwork Cylinders for Gases | Forgings Hammered and Pressed | Rolls and Rolling Mill Machinery |

# ALLIS-CHALMERS

## AA-7B Air Compressor



Compressor for Street Car Mounting

A single acting duplex compressor with crank case and cylinders integral. One-piece cylinder-head for both cylinders contains suction and discharge valves. Trunk pistons operated by connecting rods with bushings provided for taking up wear.

Heavily designed crankshaft of high-grade steel turns in journal bearings of ample proportions to insure minimum wear.

Herringbone Gears transmit power from motor shaft to crank-shaft with practically silent operation.

Lubrication is positive and efficient. Connecting rods dip into the oil and splash reaches all working parts. Gears run in oil.

*Send for Bulletin*

**ALLIS-CHALMERS MANUFACTURING CO.**
**MILWAUKEE, WIS. U.S.A.**

# DIXON'S Silica-Graphite PAINT

is immune from attacks by acids, gases and fumes. Impervious to water and not affected by heat or cold. It dries into a smooth elastic surface and lasts for long periods of time because of the pigment, flake silica-graphite and the vehicle, pure boiled linseed oil.

Dixon's is a paint in which the flake graphite and silica are *naturally* and not artificially combined, and this feature is essential to long life, efficient surface protection, elasticity and resistance to dampness.

*Write for Booklet No. 180B.*

**JOSEPH DIXON CRUCIBLE COMPANY**
Jersey City, New Jersey
Established 1827




TRADE D X N MARK

# DIXON'S Silica-Graphite PAINT

# A SAVING OF 4 to 5 POUNDS *per square foot*

YOU might just as well make your car floors pay for themselves, and you can do it if you use Truss Plate. Here's how—

Truss Plate, with wearing surface applied, weighs 4 to 5 pounds less per square foot than any other metal floor. That means a saving every year of 15 cents a square foot in hauling costs. Such saving will pay for Truss Plate in a short time.

In addition to its lighter weight, Truss Plate is fireproof, it has remarkable strength and unusual heat insulating quality, and covered with plastic wearing surface makes a practically indestructible floor.

## TRUSS-PLATE *for car flooring*



*Send for Catalog*

**Wheeling** CORRUGATING COMPANY WHEELING W. VA.



# This Paper is a "Member *of the* A.B.P."

To you, this is a fact of especial significance, for it means that this publication is part of a concerted movement to raise the level of publishing practice, to assure better service to both subscribers and advertisers.

The "A.B.P." is built upon and revolves around the following set of standards—

## STANDARDS *of* PRACTICE

THE publisher of a business paper should dedicate his best efforts to the cause of Business and Social Service, and to this end should pledge himself—

1. To consider, first, the interests of the subscriber.
2. To subscribe to and work for truth and honesty in all departments.
3. To eliminate, in so far as possible, his personal opinions from his news columns, but to be a leader of thought in his editorial columns, and to make his criticisms constructive.
4. To refuse to publish "puffs," free reading notices or paid "write-ups"; to keep his reading columns independent of advertising considerations, and to measure all news by this standard: "Is it real news?"
5. To decline any advertisement which has a tendency to mislead or which does not conform to business integrity.
6. To solicit subscriptions and advertising solely upon the merits of the publication.
7. To supply advertisers with full information regarding character and extent of circulation statements, subject to proper and authentic verification.
8. To co-operate with all organizations and individuals engaged in creative advertising work.
9. To avoid unfair competition.
10. To determine what is the highest and largest function of the field which he serves, and then to strive in every legitimate way to promote that function.

Publications which have subscribed to these standards have earned the preferred consideration accorded them.

THE ASSOCIATED BUSINESS PAPERS, INC.
220 West 42nd St., New York



# Changing red figures to black

Scarcely less important than the development of the safety car has been the St. Louis Car Co.'s service to the industry and public in increasing the capacity, beauty, safety and easy riding qualities of these light weight one-man Interurban Cars.

Directly and Indirectly this has resulted in changing certain red figures on the monthly statement to black.

*Write for details.*

## St. Louis Car Company

St. Louis, Mo.

*"The Birthplace of the Safety Car"*



*Youngstown and Surburban Railway operated by Day & Zimmerman, Inc., use HASKELITE roofs and PLYMETL sides without head linings or side linings. Cars built by G. C. Kuhlman Car Company.*

## PLYMETL

Used for side panels is superior to steel, because of its lightness, combined with greater strength and greater resiliency. Because of its great insulating value it also eliminates the need of waist linings. It makes possible a lighter, stronger car and eliminates drumming noises common to all steel construction.

## HASKELITE

5/16 inch HASKELITE roofs weigh a hundred and twenty five pounds less than 9/16 inch T. & G. poplar; they can be furnished in three to five sections, moulded or flat, minimizing joints, and their insulating value is such that no head linings are required. HASKELITE roofs contribute lightness and greater strength to the car, reducing operating and maintenance costs.

*Samples and blueprint booklet on request*

**HASKELITE MANUFACTURING CORPORATION**

133 W. WASHINGTON STREET, CHICAGO, ILL.



These attractive one-man, double-truck safety cars were delivered to the Helena (Mont.) Light & Railway Co.

*Another lot built by the*

**PERLEY A. THOMAS CAR WORKS**

**High Point, N. C.**

"THOMAS-BUILT" cars are going far and wide in ever-increasing numbers.

Why do distant traction companies come to High Point, North Carolina, for new cars? Because "Thomas-built" cars are built with an individual care and attention to details which insures attractive finish throughout and a long life of satisfactory service. Furthermore Perley A. Thomas' prices and quick deliveries appeal to the railway field.

***Let us quote on your new cars.***

**Griffin Wheel Company**

**410 North Michigan Ave.**
**Chicago, Ill.**

# GRIFFIN F. C. S. WHEELS

## For Street and Interurban Railways

FOUNDRIES:

| | | |
|---|---|---|
| Chicago | Boston | St. Paul |
| Detroit | Kansas City | Los Angeles |
| Denver | Council Bluffs | Tacoma |

Cincinnati "Tool Steel" Quality marks.

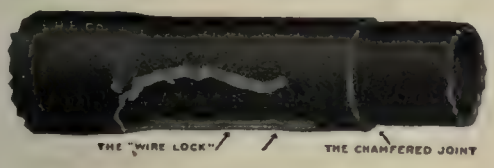



*Even when greasy you can tell "Tool Steel" by the groove.*

**The Tool Steel Gear and Pinion Co.**

**CINCINNATI, O.**

## ELRECO TUBULAR POLES




**COMBINE**

**Lowest Cost** **Lightest Weight**
**Least Maintenance** **Greatest Adaptability**

Catalog complete with engineering data sent on request.

**ELECTRIC RAILWAY EQUIPMENT CO.**
CINCINNATI, OHIO
New York City, 30 Church Street



## AIMCO

Electric Railway Automatic Signals

**for Accessibility and Reliability**

EST. 1865 AIMCO INC. 1915

"American" AIMCO INSULATING MACHINERY COMPANY

REG. U.S. PAT. OFF.

Philadelphia, New York, Paris, England

*Sales Agents:*
**Electric Service Supplies Co.**
Philadelphia New York Chicago

## AMELECTRIC PRODUCTS

AMERICAN ELECTRICAL WORKS — AMELECTRIC — Wires and Cables — PHILLIPSDALE, R.I.

Reg. U. S. Pat. Office

Incandescent Lamp Cord

BARE COPPER WIRE AND CABLE
TROLLEY WIRE
WEATHERPROOF WIRE AND CABLE
PAPER INSULATED UNDERGROUND CABLE
MAGNET WIRE

**AMERICAN ELECTRICAL WORKS**
**PHILLIPSDALE, R. I.**

Boston, 176 Federal; Chicago, 112 W. Adams; Cincinnati, Traction Bldg.; New York, 100 E. 42nd St.

## DUNDEE "A" AND "B" FRICTION TAPES




are Okonite Products

'Nuff Said!




Write for Samples and Circulars

**THE OKONITE CO., Passaic, N. J.**
Incorporated 1884

*Sales Offices: New York—Atlanta—Pittsburgh—San Francisco*
*Agents:* Central Electric Co., Chicago, Ill.; Pettingell-Andrews Co., Boston, Mass.; The F. D. Lawrence Electric Co., Cincinnati, Ohio; Novelty Electric Co., Philadelphia, Pa.
*Canadian Representatives:* Engineering Materials Limited, Montreal.

OKONITE — TRADE MARK REG. U.S. PAT. OFFICE

## Shaw Lightning Arresters

*Standard in the Electric Industries for 35 years*

**Henry M. Shaw**
*150 Coit St., Irvington, Newark, N. J.*

## Lapp Insulators

Lapp Insulator Co. Inc. LeRoy, N.Y.

Trade Mark

## Chapman Automatic Signals

**Charles N. Wood Co., Boston**



## STANDARD

**WIRES, CABLES AND CABLE ACCESSORIES**
*Manufactured by* STANDARD UNDERGROUND CABLE CO.
Boston, New York, Philadelphia, Washington, Pittsburgh, Chicago, Detroit, St. Louis, San Francisco

## ANACONDA TROLLEY WIRE



ANACONDA COPPER MINING COMPANY
Conway Building, Chicago, Ill.

THE AMERICAN BRASS COMPANY
General Offices: Waterbury, Conn.

## RAMAPO AJAX CORPORATION

Ramapo Automatic Return Switch Stands for Passing Sidings

RACOR — TRADE MARK

RACOR Tee Rail Special Work

Manganese Construction

**GENERAL OFFICES: HILBURN, NEW YORK**
Chicago New York Superior, Wis. Niagara Falls, N. Y.
**Canadian Ramapo Iron Works, Ltd., Niagara Falls, Ont.**

## ROEBLING

**WELDING CABLE**
**ELECTRICAL WIRES and CABLES**
**John A. Roebling's Sons Company, Trenton, N. J.**

## Hubbard Trolley Pole Bands



Split

Made of Open Hearth Steel. Galvanized by the Double-Dip process.
Your best insurance for long service and durability.
*Ask Your Jobber*



Solid

**HUBBARD & COMPANY**
Pittsburgh Chicago

# American Rail Bonds

CROWN
UNITED STATES
TWIN TERMINAL
SOLDER
TRIPLEX

**Arc Weld and Flame Weld**

*Send for new Rail Bond Book*

**American Steel & Wire Company**
CHICAGO
NEW YORK

## Lorain Special Trackwork Girder Rails

*Electrically Welded Joints*

**THE LORAIN STEEL COMPANY**
Johnstown, Pa.

*Sales Offices:*
Atlanta · Chicago · Cleveland · New York · Philadelphia · Pittsburgh

*Pacific Coast Representative:*
United States Steel Products Company
Los Angeles · Portland · San Francisco · Seattle

*Export Representative:*
United States Steel Products Company, New York, N. Y.

## J-P Products of interest to Electric Railways


NOARK Fuses


NOARK Fuse Clips CUTOUT BASES


NOARK Service and Underground Boxes


Railway and Mine hangers and insulators


J-P Meeting Service [Control Panels]


VULCABESTON Steel and Rope Packing

**JOHNS-PRATT CO. HARTFORD, CONN.**

## BARBOUR-STOCKWELL CO.

205 Broadway, Cambridgeport, Mass.
Established 1858

Manufacturers of

**Special Work for Street Railways**

Frogs, Crossings, Switches and Mates
Turnouts and Cross Connections
Kerwin Portable Crossovers
Balkwill Articulated Cast Manganese Crossings

ESTIMATES PROMPTLY FURNISHED



## *Cambria Rolled Steel Electric Car Wheels*

*Best for Longer Service*

Other products for the electrical field includes axles, armature shafts, rails, spikes, track work, splice bars, bolts, tie plates, tie rods, pole line material, sheets, magnet steel and gear blanks.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

# BETHLEHEM

## AUTOMATIC SIGNALS

Highway Crossing Bells
Headway Recorders
Flasher Relays

NACHOD SIGNAL COMPANY, INC.
LOUISVILLE, KENTUCKY.



## A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

**Cameron Electrical Mfg. Co., Ansonia, Connecticut**



## U. S. ELECTRIC AUTOMATIC SIGNAL

for single track block signal protection

**United States Electric Signal Co.**
West Newton, Mass.




THE ELECTRIC RAILWAY IMPROVEMENT CO.
CLEVELAND, OHIO

THE WORLD'S STANDARD

"IRVINGTON"

Black and Yellow
Varnished Silk, Varnished Cambric, Varnished Paper

Irr-O-Slot Insulation Flexible Varnished Tubing
Insulating Varnishes and Compounds

**Irvington Varnish & Insulator Co.**
Irvington, N. J.

*Sales Representatives in the Principal Cities*



Use only Awebco Tape on your Armatures
Field Coils have better protection when wound with "AWEBCO Tape." Send for samples.

**ANCHOR WEBBING COMPANY**
300 Brook Street, Pawtucket, Rhode Island

PERFECT MICANITE INSULATOR
Reg. U. S. Pat. Off.

ELECTRICAL INSULATION

Micanite armature and commutator insulation, commutator segments and rings, plate, tubes, etc., Empire oiled insulating materials; Linotape; Kablak; Mico; and other products—for the electrical insulating requirements of the railway.

*Catalogs will gladly be furnished*

**MICA INSULATOR COMPANY**
*Sole Manufacturers of Micanite*
*Established* 1893
68 Church St., New York 542 So. Dearborn St., Chicago
Works: Schenectady, N. Y.
8-F

THE BABCOCK & WILCOX COMPANY
85 LIBERTY STREET, NEW YORK

Builders since 1868 of Water Tube Boilers of continuing reliability

BRANCH OFFICES
BOSTON, 49 Federal Street
PHILADELPHIA, Packard Building
PITTSBURGH, Farmers Deposit Bank Building
CLEVELAND, Guardian Building
CHICAGO, Marquette Building
CINCINNATI, Traction Building
ATLANTA, Candler Building
PHOENIX, ARIZ., Heard Building
DALLAS, TEX., 2001 Magnolia Building
HONOLULU, H. T., Castle & Cooke Building
PORTLAND, ORE., 805 Gasco Building

THE BABCOCK & WILCOX COMPANY STEAM

WORKS
Bayonne, N. J.
Barberton, Ohio

Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893

BRANCH OFFICES
DETROIT, Ford Building
NEW ORLEANS, 521-5 Baronne Street
HOUSTON, TEXAS, Southern Pacific Building
DENVER, 435 Seventeenth Street
SALT LAKE CITY, 405-6 Kearns Building
SAN FRANCISCO, Sheldon Building
LOS ANGELES, 404-6 Central Building
SEATTLE, L. C. Smith Building
HAVANA, CUBA, Calle de Aguiar 104
SAN JUAN, PORTO RICO, Royal Bank Building

OXYGEN, ACETYLENE, HYDROGEN
*for cutting, welding, etc.*

Quick shipment and low prices also on cylinders, valves, torches, regulators and supplies.

**INTERNATIONAL OXYGEN COMPANY**
Main Offices: Newark, N. J.
Branch Offices: New York Pittsburgh Toledo

FERALITE

ALUMINO-THERMIC JOINTS

New and independent process. No inserts needed.
Up-to-date and economical.

**Alumino-Thermic Corp., Roselle Park, N. J.**

Standard of Quality

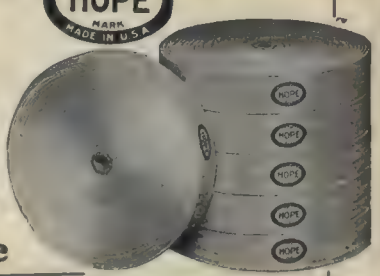
REG. U. S. PAT. OFF. TRADE HOPE MARK MADE IN U.S.A.

Quality is the total of good materials and careful manufacture.

That is why, for 40 years, manufacturers of electrical apparatus have found HOPE tapes to be the Standard of Quality.

Let us send you the HOPE Sample Booklet

Electric Tape




**HOPE WEBBING COMPANY, INC.**
PROVIDENCE, RHODE ISLAND
New York Troy Chicago

TULC
A LUBRICANT

We make a specialty of
ELECTRIC RAILWAY LUBRICATION
We solicit a test of TULC on your equipment
The Universal Lubricating Co.
Cleveland, Ohio
Tulc, Inc., Eastern Representative,
1617 Gotham National Bank Bldg., New York City

Play for safety—
plus resiliency—
plus long life
By specifying
FORT PITT SPRINGS
FORT PITT SPRING & MFG. CO.
Pittsburgh, Pa.



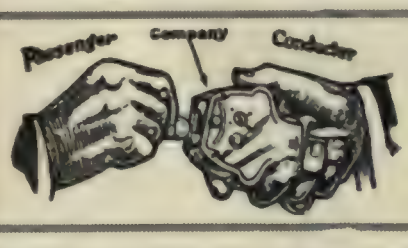
B. A. HEGEMAN, Jr., President — C. C. CASTLE, First Vice President
H. A. HEGEMAN, Vice-Pres. and Treas. — P. T. SARGENT, Secretary
W. C. PETERS, Manager Sales and Engineering
National Railway Appliance Co.
Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., New York
Munsey Bldg., Washington, D. C. — 100 Boylston St., Boston, Mass.
Hegeman-Castle Corporation, Railway Exchange Building, Chicago
RAILWAY SUPPLIES
Tool Steel Gears and Pinions
Bell Locked Fare Box and Change Maker
The Aluminum Field Coils
Truck and Car Repair Parts
Cutler Hammer Electric Heaters
Pittsburgh Forge & Iron Co.'s Products
Genesco Paint Oils
E Z Car Control Corporation's Safety Devices
Garland Ventilators
Flaxlinum Insulation
Yellow Coach Mfg. Co.'s Single and Double Deck Busses
Economy Electric Devices Co.'s Power Saving and Inspection Meters
Anglo-American Varnish Co. Varnishes, Enamels, etc.
Gilmer Multiple Safety Step Treads
National Hand Holds
Ft. Pitt Spring & Mfg. Co., Springs
Turnstile Car Corporation's Turnstiles
Anderson Slack Adjusters
Flexible Drop Brake Staffs
Dunham Hopper Door Device




HALE-KILBURN
CAR SEATS
For Every Class of Service
General Offices and Works: Philadelphia
Offices: New York, Chicago, St. Louis, Washington, San Francisco




Service is P.T.L's STANDARD
Let us help you maintain yours by progressive inspection of the cars, rails, track fastenings, creosoted materials, etc. you buy.
Our bulletin No. 28 tells how we do it—shall we send you a copy?
PITTSBURGH TESTING LABORATORY
Inspection Engineers and Chemists
PITTSBURGH, PENNA.
Branch Offices in the Principal Cities




Direct Automatic Registration By the Passengers
Rooke Automatic Register Co.
Providence, R. I.

RAILWAY UTILITY COMPANY
CAR COMFORT WITH UTILITY
HEATERS
REGULATORS
VENTILATORS
141-151 West 22d St. Chicago, Ill.
Write for Catalogue
1328 Broadway New York, N. Y.

75% of the electric railways use
B-V Punches
Send for Catalog



BONNEY-VEHSLAGE TOOL CO., Newark, N. J.

NEW and RELAYING RAILS
1 TON or 1000
TRACK EQUIPMENT
L.B. FOSTER CO.
PITTSBURGH - PENNSYLVANIA
RAIL ACCESSORIES
NEW YORK · JERSEY CITY · PHILADELPHIA · HAMILTON, O.

## HIGH SPEED MONEY CHANGERS

1924 model —without rivets— ready for delivery



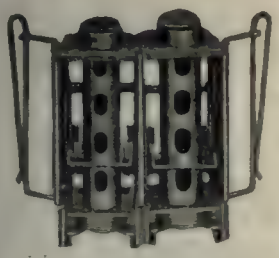

Supplied in one or four tube Combinations

Essential wherever the rapid and accurate handling of change is required. Now included in the standard equipment of largest Traction Companies because conductors demand them.

*Prices and Literature sent on request*

**J. L. GALEF, 75 Chambers St., N. Y. C.**
Exclusive Manufacturer's Selling Agent

## JOHNSON Universal Changer



### Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

### Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

**JOHNSON FARE BOX COMPANY**
Ravenswood, Chicago, Ill.




Double Register

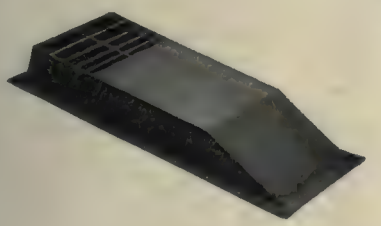
*Both our latest single and double registers are now equipped for electric as well as mechanical hand or foot operation.*

## Full Electric Operation of Fare Registers

A completely satisfactory fare registration system is one that has the confidence of the public, the conductor and the accounting department. The simplicity and accuracy of International Registers maintained for more than thirty years, is combined in the later types with the extra speed and convenience of electric operation.

**The International Register Co.**
15 South Throop St., Chicago
Exclusive Selling Agents for HEEREN Enamel Badges

## N-L Ventilators are Absolutely WEATHER PROOF



Rain! Snow! Cold, searching winds! Don't make your cars stuffy and uncomfortable this winter in order to keep them warm. *Assure yourself* that your passengers will be comfortable. N-L Ventilators will furnish adequate ventilation and are absolutely weather proof under all conditions. Many different designs for street car and bus use.

*Write for our booklet, "Superior Ventilation" for complete detail and information*

**The Nichols-Lintern Co.**
7960 Lorain Ave., Cleveland, Ohio
Canadian Representative: Railway & Power Eng. Corp., Ltd., Toronto, Ontario

THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



No. 478E

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.

## Heywood-Wakefield

**CAR SEATS**

of pressed Steel for all Classes of Passenger Service. Rattan for covering seats and for snow sweepers.

**HEYWOOD-WAKEFIELD CO.**
Factory at Wakefield, Mass.
Offices at New York, Chicago, San Francisco

For detailed description — see — CAR BUILDERS CYCLOPEDIA 1922 Edition

Let Us Tell You of Our Especially Designed Fare Box for the

## ONE MAN CAR

**THE CLEVELAND FARE BOX COMPANY**
Cleveland, Ohio
Canadian Cleveland Fare Box Co., Ltd., Preston, Ontario



*Gets Every Fare*

## PEREY TURNSTILES or PASSIMETERS

Use them in your Prepayment Areas and Street Cars

**Perey Manufacturing Co., Inc.**
101 Park Avenue, New York City



Multiple Unit Control, double truck car for two-man operation.

# McGUIRE-CUMMINGS

*Manufacturing Company*

General Offices
111 W. Monroe St., Chicago, Ill.

## Street Cars, Trucks
## Snow Sweepers




*Defective Wheels Corrected While They Run*

## WHEEL TRUING BRAKE SHOES

—keep your cars and wheels in service. Abrasive blocks in various sections correct flattening or wear on any part of flange or tread. Write for booklet.

**Wheel Truing Brake Shoe Co.**
Detroit, Mich.

Trade Mark—Wheel Truing Brake Shoe

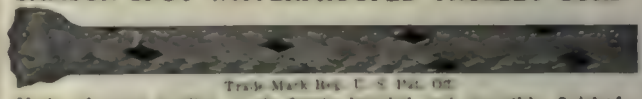
STOP

## "OSKELITE"

The Stop Light for street cars. Operates from brake system. Details on request.

**The Oskel Equipment Co.**
940 McCormick Bldg., Chicago, Ill.

SAMSON SPOT WATERPROOFED TROLLEY CORD



Trade Mark Reg. U. S. Pat. Off.
Made of extra quality stock firmly braided and smoothly finished. Carefully inspected and guaranteed free from flaws. Samples and information gladly sent.

SAMSON CORDAGE WORKS, BOSTON, MASS.




PANELYTE

## HEADLININGS

THE PANELYTE COMPANY, Trenton, N. J.

PS HEATERS

## Car Heating and Ventilation

are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

**The Peter Smith Heater Company**
6209 Hamilton Ave., Detroit, Mich.

## The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



**THE STAR BRASS WORKS**
KALAMAZOO, MICH., U. S. A.

Advertisements for the

## Searchlight Section



Can be received at the New York Office of Electric Railway Journal until 10 a. m.

## Wednesday

For issue out Saturday

0220



## Complete satisfaction

Operating perfectly and requiring minimum attention for maintenance and lubrication, Earll Catchers and Retrievers give genuinely satisfactory results. Their refinement of design, and mechanical superiority are summarized in the following five features, peculiar to Earll construction.

**No-wear Check Pawl**
**Free-Winding Tension Spring**
**Ratchet Wind**
**Emergency Release**
**Perfect Automatic Lubrication**

Earll Catchers and Retrievers

**C. I. EARLL, York, Pa.**



*"Differential Two-Car Train. Trailer dumping load clear of trench."*

## DIFFERENTIAL CARS

**Standard on Fifty Railways for**

| | |
|---|---|
| **Track Maintenance** | **Track Construction** |
| **Ash Disposal** | **Hauling Crossties** |
| **Placing Ballast** | **Disposal of Waste** |
| **Coal Hauling** | **Snow Disposal** |

**Concrete Materials to the Job**
**Excavated Material to the Dump**

***For Economy***

THE CLARK CONCRETE BREAKER
THE DIFFERENTIAL BOTTOM DUMP CAR
THE DIFFERENTIAL COMBINATION
CAR-WHEEL TRUCK and TRACTOR

**THE DIFFERENTIAL STEEL CAR CO.**
**Findlay, Ohio, U. S. A.**

## "TAYLOR-MADE" TRUCKS

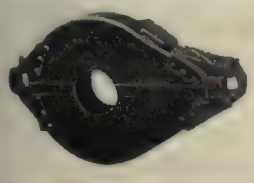
Have proven their SUPERIORITY for over 30 YEARS, for all types of electric railway cars.
Taylor R. H. Double Truck especially designed for PETER WITT Type Cars.

## TAYLOR STRAIGHT ACTION BRAKES

Have made a record for
**Safety, Low Maintenance Cost and Successful Brake Operation**
In the specifications for your new cars include
**"Taylor-Made" Trucks Equipped with Taylor Straight Action Brakes**

## TAYLOR ELECTRIC TRUCK CO., TROY, N. Y.

ESTABLISHED 1892.



## CHILLINGWORTH

**One-Piece Gear Cases**
**Seamless—Riveteless—Light Weight**
**Best for Service—Durability and Economy. *Write Us.***

**Chillingworth Mfg. Co.**
**Jersey City, N. J.**

**"Axle Specialists Since 1866"**
**Address all Mail to Post Office Box 515, Richmond, Va.**

## CAR AXLES

**J. R. JOHNSON AND CO., INC.**

**FORGED STEEL AXLES**

**For Locomotives, Passenger, Freight and Electric Cars**
**Smooth Forged or Rough Turned—Carbon or Alloy Steel—Plain or Heat Treated, Forged and Turned Piston Rods, Crank Pins, Large Shafts, Round Bars, etc.**

**"Boyerized" Products Reduce Maintenance**

| | |
|---|---|
| Bemis Trucks | Manganese Brake Heads |
| Case Hardened Brake Pins | Manganese Transom Plates |
| Case Hardened Bushings | Manganese Body Bushings |
| Case Hardened Nuts and Bolts | Bronze Axle Bearings |

Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.

**Bemis Car Truck Co., Springfield, Mass.**

**For better Axles Specify**

## "VALSCO"

## HEAT TREATED CAR AXLES

## LACLEDE STEEL CO.

**Arcade Bldg. St. Louis, Mo.**

## POSITIONS WANTED

ENGINEER, many years of experience in the construction and operation of power, refrigeration and industrial plants and management of car shops, wishes to make change for the better. Now employed as chief engineer of a steam turbine plant in Southwest; best of references. Location, Southwest U. S. Texas preferred. PW-744 Electric Railway Journal, 883 Mission St. San Francisco, Cal.

EQUIPMENT engineer, five years' street railway experience, desires change in position. At present employed. PW-745, Elec. Railway Journal, Leader News Bldg., Cleveland, Ohio.

EXPERIENCED operating man, now employed, desires change. Technical graduate, forty-one years of age, sixteen years' experience covering all branches of electric railway operation, eight years in the transportation end, with large railway company in the east. Best of references from men high in electric railway field. Desire to connect with company where ability can be demonstrated and where there is opportunity for advancement. PW-747, Electric Railway Journal, 10th Ave. at 36th St., New York.

## WANTED

# District Representative

A large Bus Manufacturing Company with a product second to none — unusual background — and strong financial backing, is about to expand its field forces. The personnel of this organization is of the highest type and unusual opportunity will be offered to men possessing proper qualifications.

Applications will be considered from men who have been successful in the sale of Motor Buses, or from Railway Executives who have operated motor buses and have had a broad transportation experience.

In writing for interview give complete personal history and experience. This will be treated in strictest confidence.

AS 748, Electric Railway Journal
1570 Old Colony Bldg., Chicago, Ill.

WANTED

## SEVERAL RAILS

Second Hand

Lorain Steel Company's section 90, No. 317.

ROME RAILWAY & LIGHT COMPANY
Rome, Georgia

For Sale—Built in 1920

**2—Kuhlman Semi-Steel Interurban Cars, Passenger, Smoker and Baggage.**

Length 54-ft. 7¼-in.; width 8-ft. 6-in.
Brill 27 MCB 2 Trucks.
4 G. E. 203 motors. Complete.

ELECTRIC EQUIPMENT CO
Commonwealth Bldg., Philadelphia, Pa.

# Rails!

## In Small Lots As Well As Large

**THERE is a class of rail buyers, occasionally in need of only small tonnages, who are paying a premium on their purchases elsewhere because they believe that we do not seek their patronage.**

We maintain a large organization to give efficient service on small orders. Our tremendous volume gives us unequaled buying power and saves our clients money regardless of the tonnage required.

Immense stocks at strategic distributing points provide complete assortments near you. This adds a saving in freight to our already unbeatable prices.

Next time you need rails, let us know your requirements.

*We guarantee the same prompt, efficient service to all.*

## HYMAN-MICHAELS COMPANY

*"The House of Dependable Service"*

**122 South Michigan Avenue, Chicago**

**Dealers in New and Relaying Rails, Locomotives and Railway Equipment**

*District Offices:* New York, Woolworth Bldg.; St. Louis, Railway Exchange Bldg.; Pittsburgh, First Nat'l Bank Bldg.; San Francisco, 234 Steuart St.
*Yards:* St. Louis, East Chicago, Ind., McKee's Rocks, Pa., San Francisco.
*Cable Address:* "Hymanmikel"
*World's Largest Distributors of Rails*

FOR SALE

## New Root Snow Scrapers

16 Sets Air Operated.

TRANSIT EQUIPMENT CO.
*Cars—Motors*
501 Fifth Ave., New York

## TO HELP YOU

LOCATE SELLING OPPORTUNITIES

**"Searchlight" Advertising**

G-6

## RAILS

**New** **Relaying**

FROGS
SWITCHES
SPLICE BARS
BOLTS
NUTS
TIE PLATES
RAIL
BRACES

All Rails and Track Materials shipped subject to inspection and approval at destination.

**L. B. Foster Co.**

PITTSBURGH-PA
NEW YORK

## *"Think* SEARCHLIGHT *First"*—

### *To Find Men or Employment*

Technical or Skilled, Plant or Office, Executive, Operative or Selling

### *To Locate Business Opportunities*

Capital, Partners, Selling Agencies, Franchises, Contracts, Auctions, Instructions, etc.

### *To Sell, Rent, Exchange or Buy*

Plants, Properties, Factory Buildings, Industrial Sites, Patents, Inventions or Miscellaneous Items.

0168

FOR SALE

# One-Man Double End Safety Cars



*Selections may be made from a lot of two hundred.*
*Cars are three years old and in first-class condition.*

**The Department of Street Railways, City of Detroit, Mich.,** offers for sale any part of Two Hundred Single-Truck, Double-End Safety Cars, for Standard Gauge Track, equipped with air-operated Snow Scrapers, air-operated "R10" Registers, headlinings, center lighting with opal shades, electric heat, Utility Regulators, Nichols-Lintern tail lights, and Ohio Brass Trolley stands. Westinghouse 508 and General Electric 264 Motors. Westinghouse DH-16 and General Electric CP-27 Air Compressors. 26-in. Steel Wheels. Standard Safety Car Devices Co. equipment. Cars are of Standard Safety Car dimensions, and weigh approximately 17,000 pounds.

Bodies and Trucks were built by the J. G. Brill Car Co., St. Louis Car Co., Osgood-Bradley Car Co., and McGuire-Cummings Mfg. Co., and purchaser may select any of these type Cars.

Cars may be inspected by calling at the Department of Street Railways, Detroit, Michigan.

Bids are solicited for any part of the above offering, f.o.b. flat cars, Detroit, Michigan, and these may be directed to Frank Meyer, Jr., Purchasing Agent, Department of Street Railways, Administration Building, St. Jean & Shoemaker Aves., Detroit, Michigan.

**Bids will be opened on Monday, December 8th, at 11:00 A. M.,**
at which time same will be given consideration.

If interested in the purchase of the above kindly get in touch with the Department of Street Railways before date that bids are to be opened, for information relative to submitting formal bid, etc.

# WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

**Advertising, Street Car**
Collier, Inc., Barron G.

**Air Receivers, Aftercoolers**
Ingersoll-Rand Co.

**Anchors, Guy**
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

**Armature Shop Tools**
Elec. Service Supplies Co.

**Automatic Return Switch Stand**
Ramapo Ajax Corp.

**Automatic Safety Switch Stands**
Ramapo Ajax Corp.

**Axles**
Bemis Car Truck Co.
Johnson & Co., J. R.
Laclede Steel Co.
St. Louis Car Co.
Taylor Elec. Truck Co.

**Axles, Bus**
Standard Steel Co.

**Axles (Front & Rear) Motor Bus & Passenger Car**
Timken-Detroit Axle Co.

**Axle Straighteners**
Columbia M. W. & M. I. Co.

**Axles, Trailer & Motor Bus**
Timken-Detroit Axle Co

**Axles, Car Wheel**
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Johnson & Co., J. R.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.

**Badges and Buttons**
Elec. Service Supplies Co.
International Register Co., The

**Batteries, Dry**
Nichols-Lintern Co.

**Bearings and Bearing Metals**
Bemis Car Truck Co.
General Electric Co.
A. Gilbert & Sons, B. F. Co.
More-Jones Brass & Metal Co.
Taylor Electric Truck Co
Westinghouse Elec. & M. Co.

**Bearings, Center and Roller Side**
Stucki Co., A.

**Bells and Gongs**
Brill Co., The J. G.
Consolidated Car Heating Co.
Elec. Service Supplies Co.

**Benders, Rail**
Railway Track-work Co.

**Bodies, Bus**
Superior Motor Coach Body Co
Auto Body Co.

**Boiler Tubes**
Nat'l Tube Co.

**Boilers**
Babcock & Wilcox Co., The

**Bond Testers**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.

**Bonding Apparatus**
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Railway Track-work Co.

**Bonds, Rail**
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse Elec. & M. Co.

**Boxes, Switch**
Johns-Pratt Co.

**Brackets and Cross Arms (See also Poles, Ties, Posts etc.)**
American Bridge Co.
Bates Expanded Steel Truss Co.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

**Brake Adjusters**
Nat'l Ry. Appliance Co.
Westinghouse Tr. Br. Co.

**Brake Shoes**
Amer. Brake Shoe & Fdry. Co.
Harbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Taylor Electric Truck Co.
Wheel Truing Brake Shoe Co.

**Brakes, Brake Systems and Brake Parts**
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
General Electric Co.
National Brake Co.
Safety Car Device Co.
Taylor Electric Truck Co.
Westinghouse Tr. Br. Co.

**Brushes, Carbon**
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Morganite Brush Co., Inc
Westinghouse Elec. & M. Co.

**Brushes, Graphite**
Morganite Brush Co., Inc

**Brush Holders**
Anderson Mfg. Co., A. & J. M
Columbia M. W. & M. I. Co.

**Brushes, Wire Pneumatic**
Ingersoll-Rand Co.

**Bulkheads**
Haskelite Mfg. Co.

**Bunkers, Coal**
American Bridge Co.

**Buses, Motor**
Brill Co., The J. G.
International Motor Co.
St. Louis Car Co.

**Bushings, Case Hardened and Manganese**
Bemis Car Truck Co.
Brill Co., The J. G.

**Cables**
(See Wires and Cables)

**Calculating Machines**
W. A. Morschhauser

**Cambric Tapes, Yellow & Black Varnish**
Irvington Varnish & Ins. Co.

**Cambric Yellow & Black Varnish**
Mica Insulator Co.

**Carbon Brushes**
(See Brushes, Carbon)

**Car Flooring**
Wheeling Corrugated Co.

**Car Lighting Apparatus**
Elec. Service Supplies Co.

**Car Panel Safety Switches**
Consolidated Car Heating Co
Westinghouse Elec. & M. Co.

**Car Wheels, Rolled Steel**
Bethlehem Steel Co.

**Cars, Dump**
Differential Steel Car Co., Inc.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

**Cars, Gas Rail**
St. Louis Car Co.

**Cars, Passenger, Freight Express, etc.**
American Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Thomas Car Wks., Perley A.
Wason Mfg. Co.

**Cars, Second Hand**
Electric Equipment Co.
Transit Equipment Co.

**Cars, Self-Propelled**
General Electric Co.

**Castings, Brass, Composition or Copper**
Anderson Mfg. Co., A. & J. M
More-Jones Brass & Metal Co.

**Castings, Funnel**
Wharton, Jr. & Co., Inc., Wm.

**Castings, Gray Iron and Steel**
American Bridge Co.
American Steel Foundries
Bemis Car Truck Co.

**Castings, Malleable and Brass**
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.

**Catchers and Retrievers, Trolley**
Earll, C. I.
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. M.

**Catenary Construction**
Archbold-Brady Co.

**Change Carriers**
Cleveland Fare Box Co.
Galef, J. L.

**Circuit Breakers**
General Electric Co.
Westinghouse Elec. & M. Co.

**Clamps and Connectors for Wires and Cables**
Anderson Mfg. Co., A. M. & J. M.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
WestinghouseElec . & M. Co.

**Cleaners and Scrapers, Track (See also Snow-Plows, Sweepers and Brooms)**
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
Ohio Brass Co.

**Clusters and Sockets**
General Electric Co.

**Coal and Ash Handling (See Conveying and Hoisting Machinery)**

**Coils, Armature and Field**
General Electric Co
Westinghouse Elec. & M. Co.

**Coil Banding and Winding Machines**
Electric Service Sup. Co.
Westinghouse Elec. & M. Co.

**Coils, Choke and Kicking**
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

**Coin-Counting Machines**
Cleveland Fare Box Co.
Galef, J. L.
International Register Co. The
Johnson Fare Box Co.

**Coin Sorting Machines**
Cleveland Fare Box Co.
Galef, J. L.

**Coin Wrappers**
Cleveland Fare Box Co.
Galef, J. L.

**Commutator Slotters**
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

**Commutator Truing Devices**
General Electric Co.

**Commutators or Parts**
Cameron Elec'l Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

**Compressors, Air**
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.

**Compressors, Air, Portable**
Ingersoll-Rand Co.

**Compressors, Gas**
Ingersoll-Rand Co.

**Concrete Reinforcing Bars**
Laclede Steel Co.

**Condensers**
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll Rand Co.
Westinghouse Elec. & M. Co.

**Condenser Papers**
Irvington Varnish & Ins. Co.

**Conduits, Underground**
Std. Underground Cable Co.

**Connectors, Solderless**
Westinghouse Elec. & M. Co.

**Connectors, Trailer Car**
Consolidated Car Heating Co.
Elec. Service Supplies Co.
Ohio Brass Co.

**Controllers or Parts**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

**Controller Regulators**
Electric Service Supplies Co.

**Controlling Systems**
General Electric Co.
Westinghouse Elec. & M. Co.

**Converters, Rotary**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

**Conveying and Hoisting Machinery**
Columbia M. W. & M. I. Co.

**Copper Wire**
Anaconda Copper Mining Co.
Rome Wire Co.

**Cord, Bell, Trolley, Register, Etc.**
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Roeblings Sons Co., John A.
Samson Cordage Works

**Cord Connectors and Couplers**
Electric Service Supplies Co
Samson Cordage Work
Wood Co., Chas. N.

**Couplers, Car**
American Steel Foundries
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Tr. Br. Co.

**Cranes**
Allis-Chalmers Mfg. Co

**Cross Arms (See Brackets)**

**Crossings**
Ramapo Ajax Corp.

**Crossing Foundations**
International Steel Tie Co.

**Crossing Frogs and Switches**
Ramapo Ajax Corp
Wm. Wharton Jr. & Co., Inc.

**Crossings, Manganese**
Bethlehem Steel Co
Indianapolis Switch & Frog Co.
Ramapo Ajax Corp.

**Crossing Signals (See Signal Systems, Highway Crossing)**

**Crossings, Track, (See Track, Special Work)**

**Crossings, Trolley**
Ohio Brass Co.

**Crushers, Rock**
Allis-Chalmers Mfg. Co.

**Curtains and Curtain Fixtures**
Brill Co., The J. G.
Electric Service Supplies Co.
Morton Mfg. Co.

**Cutouts**
Johns Pratt Co.

**Dealers' Machinery**
Electric Equipment Co.
Hyman Michaels Co
Transit Equipment Co.

**Derailing Switches, Tee Rail**
Ramapo Ajax Corp.

**Destination Signs**
Electric Service Supplies Co.

**Detective Service**
Wish Service, P. Edward

**Door Operating Devices**
Consolidated Car Heating Co
National Pneu. Co. Inc.
Safety Car Device Co.

**Doors and Door Fixtures**
Brill Co., The J. G.
General Electric Co.
Hale-Kilburn Co.
St. Louis Car Co.

**Doors, Folding Vestibule**
National Pneumatic Co., Inc

**Draft Rigging, (See Couplers)**

**Drills, Track**
American Steel & Wire Co
Electric Service Supplies Co.
Ingersoll-Rand Co.
Ohio Brass Co.

**Dryers, Sand**
Electric Service Supplies Co.

**Ears**
Ohio Brass Co.

**Electric Grinders**
Railway Track-work Co.

**Electrodes, Carbon**
Indianapolis Switch & Frog Co.
Railway Track-work Co.

**Electrodes, Steel**
Indianapolis Switch & Frog Co.
Railway Track-work Co.

**Electrical Wires and Cables**
American Elec. Works
Roeblings Sons Co., J. A.
Rome Wire Co.

**Engineers, Consulting, Contracting and Operating**
Allison & Co., J. E.
Archbold-Brady Co.
Beeler, John A.
Buchanan & Layng
Bureau of Commercial Economics, Inc.
Byllesby & Co., H. M.
Day & Zimmerman, Inc.
Drum & Co., A. L.
Feustel, Robert M.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Ong, Jee R.
Parsons, Klapp, Brinkerhoff & Douglas
Railway Audit & Inspection Co.
Richey, Albert S.
Dwight P. Robinson & Co.
Sanderson & Porter
Shaw, Henry M.
Stevens & Wood, Inc.
Stone & Webster

**Engineers Inspecting & Chemists**
Pittsburgh Testing Laboratory

**Engines, Gas, Oil and Steam**
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse Elec. & M. Co.

**Expansion Joints, Track**
Wharton, Jr., & Co., Inc., Wm.

**Exterior Side Panels**
Haskelite Mfg. Co.

**Fare Boxes**
Cleveland Fare Box Co.
Galef, J. L.
Nat'l Ry. Appliance Co.

**Fences, Woven Wire and Fence Posts**
Amer. Steel & Wire Co.

**Fenders and Wheel Guards**
Brill Co., The J. G.
Consolidated Car Fender Co
Electric Service Sup. Co.
Star Brass Works

**Fibre and Fibre Tubing**
Westinghouse Elec. & M. Co

**Field Coils (See Coils)**

**Flaxlinum Insulation**
Nat'l Ry. Appliance Co.

**Floodlights**
Electric Service Sup. Co.

**Forgings**
Carnegie Steel Co.
Columbia M. W. & M. I. Co.

**Frogs & Crossings, Tee Rail**
Bethlehem Steel Co.
Ramapo Ajax Corp.

**Frogs, Track. (See Track Work)**

**Frogs, Trolley**
Ohio Brass Co.

**Funnel Castings**
Wm. Wharton Jr. & Co.

**Furnaces, Electric**
American Bridge Co.

**Fuses Cartridge, Non Refillable & High Voltage**
Johns Pratt Co.

**Fuses Cartridge, Refillable**
Johns Pratt Co.

**Fuses and Fuse Boxes**
Consolidated Car Heating Co.
General Electric Co.
Westinghouse Elec. & M. Co.

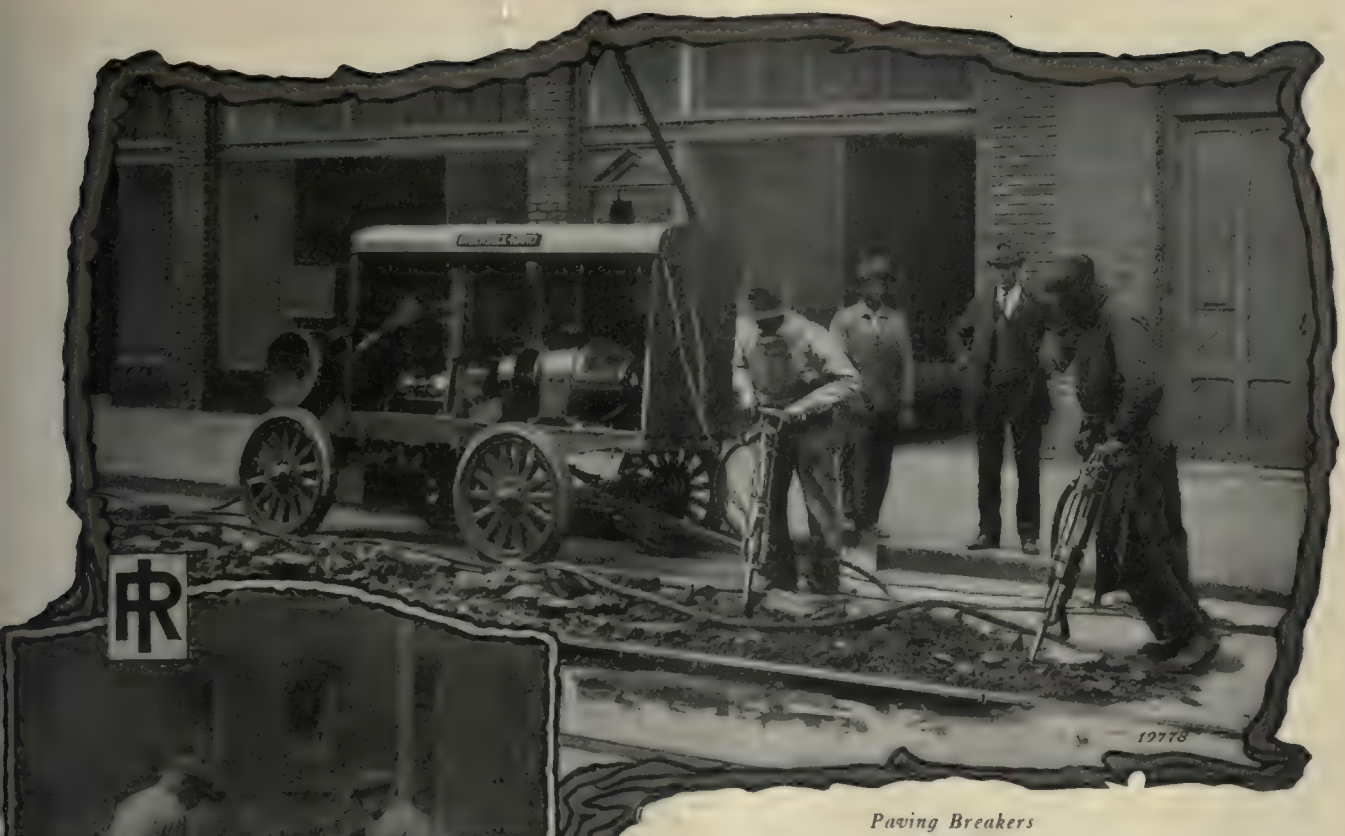
**Fuses, Refillable**
General Electric Co.

**Gaskets**
Westinghouse Tr. Br. Co.

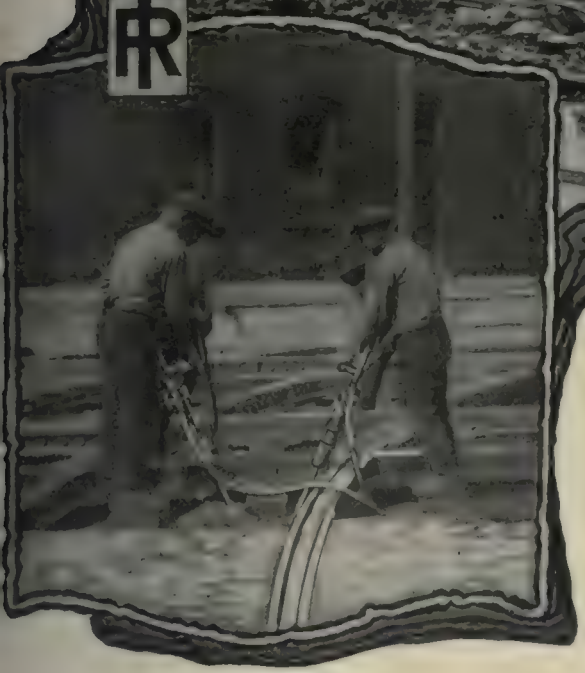
**Gas-Electric Cars**
General Electric Co.

**Gas Producers**
Westinghouse Elec. & M. Co

**Gates, Car**
Brill Co., The J. G.



*Paving Breakers*



*Tie Tampers*

## The Compressed Air Way Saves Time and Money

Ingersoll-Rand Portable Air Compressors and Tools finish up many jobs in a fraction of the time required by hand methods.

Pneumatic "Paving Breakers" save more than 50% in time and labor over hand methods, when breaking out pavement shoulders, heavy foundations, etc.

Pneumatic Tie Tampers enable four men to tamp more track and do it better than twelve to sixteen men using hand methods.

Other air tools are also used to save money on various jobs, making the portable compressor outfit a most important factor in reducing track costs. Ask for complete information on the savings made with portable air-power units.

***Ingersoll-Rand Track Tools include—***

**Paving Breakers,**
**Tie Tampers,**
**Grinders,**
**Riveters,**
**Chippers,**
**Spike Drivers**

**INGERSOLL-RAND COMPANY, 11 Broadway, New York**

*Offices in Principal Cities the World Over*

**For Canada refer Canadian Ingersoll-Rand Co., Limited, 260 St. James Street, Montreal, Quebec**

# Ingersoll-Rand

**Gear Blanks**
Bethlehem Steel Co.
Carnegie Steel Co.

**Gear Cases**
Chillingworth Mfg. Co.
Electric Service Supplies Co.
Westinghouse Elec. & M. Co.

**Gears and Pinions**
Bemis Car Truck Co.
Bethlehem Steel Co.
Electric Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

**Generating Sets, Gas-Electric**
General Electric Co.

**Generators**
Allis-Chalmers Mfg. Co.
English Electric Co.
General Electric Co.
Westinghouse Elec. & M. Co.

**Girder Rails**
Bethlehem Steel Co.
Lorain Steel Co., The

**Goggles, Safety**
Indianapolis Switch & Frog Co.

**Gongs (See Bells and Gongs)**

**Greases (See Lubricants)**

**Grinders and Grinding Supplies**
Indianapolis Switch & Frog Co.
Railway Track-work Co.

**Grinders, Portable**
Railway Track-work Co.

**Grinders, Portable Electric**
Railway Track-work Co.

**Grinding Blocks and Wheels**
Railway Track-work Co.

**Guard Rail Clamps**
Ramapo Ajax Corp.

**Guard Rails, Tee Rail & Manganese**
Ramapo Ajax Corp.

**Guards, Cattle**
American Bridge Co.

**Guards, Trolley**
Electric Service Sup. Co.
Ohio Brass Co.

**Hammers, Pneumatic**
Ingersoll-Rand Co.

**Harps, Trolley**
Anderson M. Co., A. & J. M.
Electric Service Sup. Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Thornton Trolley Wheel Co.

**Headlights**
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.

**Headlining**
Haskelite Mfg. Co.
Panelyte Co.

**Heaters, Car (Electric)**
Consolidated Car Heating Co.
Gold Car Heating & Lighting Co.
Nat'l Ry. Appliance Co.
Smith Heater Co., Peter

**Heaters, Car, Hot Air and Water**
Electric Service Sup. Co.
Smith Heater Co., Peter Wm.

**Helmets, Welding**
Indianapolis Switch & Frog Co.
Railway Track-work Co.

**Hoists, Portable**
Ingersoll-Rand Co.

**Hose, Bridge**
Ohio Brass Co.

**Hydraulic Machinery**
Allis-Chalmers Mfg. Co.

**Indicating, Signals**
Nichols-Lintern Co.
Oskel Equipment Co.

**Inspecting Engineers & Chemists**
Pittsburgh Testing Laboratory

**Instruments, Measuring, Testing and Recording**
Electric Service Sup. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

**Insulating Cloth, Paper and Tape**
Anchor Webbing Co.
General Electric Co.
Hope Webbing Co.
Irvington Varnish & Ins. Co.
Mitchell-Rand Co.
Okonite Co.
Standard Underground Cable Co.
Westinghouse E. & M. Co.

**Insulating Machinery**
Amer. Ins. Machinery Co.

**Insulating Silk**
Irvington Varnish & Ins. Co.

**Insulating Varnishes**
Irvington Varnish & Ins. Co.

**Insulation (See also Paints)**
Anderson M. Co., A. & J. M.
Electric Ry. Equipment Co.
Electric Service Sup. Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Mica Insulator Co.
Mitchell-Rand Co.
Okonite Co.
Westinghouse Elec. & M. Co.

**Insulation, Cloth Paper & Tape**
Mitchell-Rand Co.
Mica Insulator Co.

**Insulation, Slot**
Irvington Varnish & Ins. Co.

**Insulator Pins**
Electric Service Sup. Co.
Hubbard & Co.

**Insulators (See also Line Material)**
Anderson M. Co., A. & J. M.
Electric Ry. Equipment Co.
Electric Service Sup. Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

**Insulators, High Voltage**
Lapp Insulator Co., Inc.

**Jacks (See also Hoists and Lifts)**
Electric Service Sup. Co.
National Ry. Appliance Co.

**Journal Boxes**
Bemis Car Truck Co.
Brill Co., The J. G.

**Junction Boxes**
Standard Underground Cable Co

**Lamp Guards and Fixtures**
Anderson M. Co., A. & J. M.
Electric Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Lamps, Arc and Incandescent (See also Headlights)**
Anderson M. Co., A. & J. M.
General Electric Co.
Westinghouse E. & M. Co.

**Lamps, Signal and Marker**
Nichols-Lintern Co.

**Lanterns, Classification**
Nichols-Lintern Co.

**Lightning Arresters**
Shaw, Henry M.

**Lightning Protection**
Anderson M. Co., A. & J. M.
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

**Line Material (See also Brackets, Insulators, Wires, Etc.)**
Anderson M. Co., A. & J. M.
Archbold-Brady Co.
Columbia M. W. & M. I. Co.
Electric Ry. Equipment Co.
Electric Service Sup. Co.
English Electric Co.
General Electric Co.
Hubbard & Co.
More-Jones Brass & Metal Co.
Westinghouse Elec. & M. Co.

**Locking Spring Boxes**
Wm. Wharton Jr. & Co., Inc.

**Locomotives, Electric**
General Electric Co.
Westinghouse Elec. & M. Co.

**Locomotives, Oil Engine, Electric Driven**
Ingersoll-Rand Co.

**Lubricating Engineers**
Galena-Signal Oil Co.
Universal Lubricating Co.

**Lubricants, Oil and Grease**
Galena Signal Oil Co.
Universal Lubricating Co.

**Lumber (See Poles, Ties, etc.)**

**Machine Tools**
Columbia M. W. & M. I. Co.

**Manganese Parts**
Bemis Car Truck Co.

**Manganese Steel Castings**
Wm. Wharton Jr. & Co., Inc.

**Manganese Steel Guard Rails**
Ramapo Ajax Corp

**Manganese Steel, Special Track Work**
Bethlehem Steel Co.
Indianapolis Switch & Frog Co.
Wm. Wharton Jr. & Co., Inc.

**Manganese Steel Switches, Frogs and Crossings**
Bethlehem Steel Co
Ramapo Ajax Corp

**Meters, Car Watt-Hour**
Economy Electric Devices Co.

**Mica**
Mica Insulator Co.

**Motor and Generator Sets**
General Electric Co.

**Motor Buses**
(See Buses, Motor)

**Motormen's Seats**
Brill Co., The J. G.
Electric Service Sup. Co.
St. Louis Car Co.
Wood Co., Chas. N.

**Motors, Electric**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

**Nuts and Bolts**
Allis-Chalmers Mfg. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Bethlehem Steel Co.
Columbia M. W. & M. I. Co.
Hubbard & Co.

**Oils (See Lubricants)**

**Oxygen**
International Oxygen Co.

**Paint & Varnishes (Insulating)**
Mitchell-Rand Co.

**Packing**
Electric Service Sup. Co.
Westinghouse Tr. Br. Co.

**Paints & Varnish Preservatives**
Baldwin Locomotive Wks.

**Paints and Varnishes for Woodwork**
National Ry. Appliance Co.

**Pavement Breakers**
Ingersoll Rand Co.

**Paving Material**
Amer. Br. Shoe & Fdry. Co.

**Pickups, Trolley Wire**
Electric Service Sup. Co.
Ohio Brass Co.

**Pinion Pullers**
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
General Electric Co.
Wood Co., Chas. N.

**Pinions (See Gears)**

**Pins, Case Hardened, Wood and Iron**
Bemis Car Truck Co.
Electric Service Sup. Co
Ohio Brass Co.
Westinghouse Tr. Br. Co.

**Pipe**
National Tube Co.

**Planers (See Machine Tools)**

**Plates for Tee Rail Switches**
Ramapo Ajax Corp.

**Pliers, Rubber Insulated**
Electric Service Sup. Co.

**Pneumatic Tools and Accessories**
Ingersoll-Rand Co.

**Pole Line Hardware**
Bethlehem Steel Co.
Ohio Brass Co.

**Pole Reinforcing**
Drew Elec. & Mfg. Co.
Hubbard & Co.

**Poles and Ties, Treated**
Bell Lumber Co.

**Poles, Metal Street**
Bates Expanded Steel Truss Co.
Electric Ry. Equip. Co.
Hubbard & Co.

**Poles, Ties, Posts, Piling and Lumber**
Bell Lumber Co.

**Poles, Trolley**
Anderson M. Co., A. & J. M.
Columbia M. W. & M. I. Co
National Tube Co.
Nuttall Co., R. D.

**Poles, Tubular Steel**
Elec. Ry. Equip. Co.
Electric Service Sup. Co.
National Tube Co

**Porcelain, Special High Voltage**
Lapp Insulator Co.

**Portheads**
Okonite Co.

**Power Saving Devices**
Nat'l Ry. Appliance Co.

**Pressure Regulators**
General Electric Co.
Westinghouse Elec. & M. Co.

**Pumps**
Allis-Chalmers Mfg. Co.
Ingersoll Rand Co.

**Pumps, Vacuum**
Ingersoll-Rand Co.

**Punches, Ticket**
Bonney-Vehslage Tool Co.
International Register Co., The
Wood Co., Chas. N

**Rail Braces and Fastenings**
Ramapo Ajax Corp.

**Rail Joints**
Carnegie Steel Co

**Rail Joints, Welded**
Indianapolis Switch & Frog Co.

**Rail Grinders (See Grinders)**

**Rails, Relaying**
L. B. Foster Co.
Hyman-Michaels Co.

**Rails, Steel**
Carnegie Steel Co.
L. B. Foster Co.

**Railway Safety Switches**
Consolidated Car Heating Co.
Westinghouse Elec. & M. Co.

**Railway Welding (See Welding Processes)**

**Rattan**
Brill Co., The J. G.
Electric Service Sup. Co.
Hale-Kilburn Co.
Heywood-Wakefield Co.
St. Louis Car Co.

**Registers and Fittings**
Brill Co., The J. G.
Electric Service Sup. Co
International Reg. Co., The
Rooke Automatic Reg. Co.

**Reinforcement, Concrete**
Amer. Steel & Wire Co.
Bethlehem Steel Co.
Carnegie Steel Co.

**Repair Shop Appliances (See also Coil Banding and Winding Machines)**
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.

**Repair Work (See also Coils)**
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

**Replacers, Car**
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.

**Resistance, Grid**
Columbia M. W. & M. I. Co.

**Resistance, Wire and Tube**
General Electric Co.
Westinghouse Elec. & M. Co.

**Resistances**
Consolidated Car Heating Co.

**Retrievers, Trolley (See Catchers and Retrievers, Trolley)**

**Rheostats**
General Electric Co.
Westinghouse Elec. & M. Co.

**Roofs**
Haskelite Mfg. Co.

**Sanders, Track**
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
Nichols-Lintern Co.
Ohio Brass Co.

**Sash Fixtures, Car**
Brill Co., The J. G.

**Sash, Metal, Car Window**
Hale-Kilburn Co.

**Scrapers, Track (See Cleaners and Scrapers, Track)**

**Screw Drivers, Rubber Insulated**
Electric Service Sup. Co.

**Seating Materials**
Brill Co., The J. G.

**Seats, Bus**
Hale-Kilburn Co.
Heywood-Wakefield Co.
St. Louis Car Co.

**Seats, Car (See also Rattan)**
Brill Co., The J. G.
Hale-Kilburn Co
Heywood-Wakefield Corp.
St. Louis Car Co.

**Second-Hand Equipment**
Electric Equipment Co.
Hyman-Michaels Co.
Transit Equipment Co
Zelnicker Supply Co., W. A.

**Shades, Vestibule**
Brill Co., The J. G.

**Shovels**
Hubbard & Co.

**Shovels, Power**
Allis-Chalmers Mfg. Co.
Brill Co., The J. G.

**Signals, Car Starting**
Consolidated Car Heating Co.
Electric Service Sup. Co.
Nat'l Pneumatic Co., Inc.

**Signals, Indicating**
Nichols-Lintern Co.
Oskel Equipment Co

**Signal Systems, Block**
Electric Service Sup. Co.
Nachod Signal Co., Inc.
U. S. Electric Signal Co.
Wood Co., Chas. N

**Signal Systems, Highway Crossing**
Nachod Signal Co., Inc.
U. S. Electric Signal Co.

**Slack Adjusters (See Brake Adjusters)**

**Slag**
Carnegie Steel Co

**Steel Wheels and Cutters**
Anderson M. Co., A. & J. M
Electric Ry. Equip. Co.
Electric Service Sup. Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.

**Smokestacks, Car**
Nichols-Lintern Co.

**Snow-Plows, Sweepers and Brooms**
Brill Co., The J. G.
Consolidated Car Fender Co.

**Snow Sweeper, Rattan**
Heywood-Wakefield Co.

**Soldering and Brazing (See Welding Processes and Apparatus)**

**Spikes**
Amer. Steel & Wire Co.

**Special Adhesive Papers**
Irvington Varnish & Ins. Co.

**Special Trackwork**
Bethlehem Steel Co.
Lorain Steel Co., The

**Splicing Compounds**
Westinghouse Elec. & M. Co.

**Splicing Sleeves (See Clamps and Connectors)**

**Springs, Car and Truck**
American Steel Foundries
Bemis Car Truck Co.
Brill Co., The J. G.
Ft. Pitt Spring & Mfg. Co.
St. Louis Car Co
Taylor Electric Truck Co.

**Sprinklers, Track and Road**
Brill Co., The J. G.

**Steel Castings**
Wm. Wharton Jr. & Co., Inc.

**Steel and Steel Products**
Morton Mfg. Co.

**Steps, Car**
Morton Mfg. Co

**Stokers, Mechanical**
Babcock & Wilcox Co.
Westinghouse Elec. & M. Co.

**Stop, Signals**
Oskel Equipment Co.

**Storage Batteries (See Batteries, Storage)**

**Strain Insulators**
Ohio Brass Co.

**Strand**
Roebling's Sons Co., J. A.

**Subway Boxes**
Johns-Pratt Co.

**Superheaters**
Babcock & Wilcox Co.

**Sweepers, Snow (See Snow Plows, Sweepers and Brooms)**

**Switch Stands**
Indianapolis Switch & Frog Co.
Ramapo Ajax Corp.

**Switches, Safety**
Johns-Pratt Co.

**Switches and Switchboards**
Allis-Chalmers Mfg. Co.
Anderson M. Co., A. & J. M.
Electric Service Sup. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

**Switches, Selector**
Nichols-Lintern Co.

**Switches, Tee Rail**
Ramapo Ajax Corp.

**Switches, Track (See Track Special Work)**

**Tampers, Tie**
Ingersoll-Rand Co.
Railway Track-work Co.

**Tapes and Cloths (See Insulating Cloth, Paper and Tape)**

**Tee Rail, Special Track Work**
Bethlehem Steel Co.
Ramapo Ajax Corp.

**Telephones and Parts**
Electric Service Sup. Co

**Terminals, Cable**
Standard Underground Cable Co

**Testing Devices, Meter**
Johns Pratt Co

**Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)**

**Thermostats**
Consolidated Car Heating Co
Gold Car Heating & Lighting Co.
Railway Utility Co.
Smith Heater Co., Peter

**Ticket Choppers and Destroyers**
Electric Service Sup. Co

**Ties and Tie Rods, Steel**
American Bridge Co
Barbour-Stockwell Co.
Carnegie Steel Co.
International Steel Tie Co

You're having brush trouble

CORRECT IT

USE LE CARBONE CARBON BRUSHES

They talk for themselves

COST MORE PER BRUSH
COST LESS PER CAR MILE

W. J. Jeandron
345 Madison Avenue, New York
Pittsburgh Office: 634 Wabash Bldg.
Chicago Office: 1657 Monadnock Block
San Francisco Office: 525 Market Street
Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal and Toronto

BRAKE SHOES
AERA Standards
Brake Heads



Diamond "S" Steel Back and Lug Shoes best for all equipment.

Manufactured and sold under U. S. Patent and Registered Trade Mark.

American Brake Shoe and Foundry Co.
30 Church Street, New York
332 So. Michigan Ave., Chicago



Tests Prove That Fewer Inspections Are Required

This fact about the Thornton Side Bearing Trolley Wheel is due to the method of lubrication and the extremely long life of the bearings. The construction insures a perfectly balanced wheel and freedom from vibration and noise. Users are getting over 50,000 miles from the side bearings. Write for Bulletin.

Thornton Trolley Wheel Co.
Incorporated
Ashland, Kentucky



MORE-JONES "TIGER" BRONZE
AXLE & ARMATURE BEARINGS

Strong-tough-durable
anti-frictional
economical

MORE-JONES BRASS & METAL CO
ST. LOUIS MISSOURI

100 New Users in the Last Nine Months
KASS SAFETY TREADS
HIGH
in efficiency and lasting qualities
LOW
in weight, initial and upkeep costs
Morton Manufacturing Co., Chicago

Northern CEDAR POLES Western
We guarantee
all grades of poles; also any butt-treating specifications
BELL LUMBER COMPANY
Minneapolis, Minn.



STUCKI SIDE BEARINGS
A. STUCKI CO.
Oliver Bldg.
Pittsburgh, Pa.

PROVIDENCE FENDERS
H-B LIFE GUARDS
The Consolidated Car Fender Co., Providence, R. I.
Wendell & MacDuffie Co., 110 E. 42nd St., New York
General Sales Agents

**Ties, Wood Cross (See Pole, Ties, Posts, etc.)**

**Tokens**
Scovill Mfg. Co.

**Tongue Switches**
Wm. Wharton Jr. & Co.

**Tool Steel**
Bethlehem Steel Co.
Carnegie Steel Co.

**Tools, Track and Misc.**
Amer. Steel & Wire Co.
Electric Service Sup. Co.
Hubbard & Co.
Railway Track-work Co.

**Towers and Transmission Structures**
Archbold-Brady Co.
Bates Expanded Steel Truss Co.
Westinghouse Elec. & M. Co.

**Track Expansion Joints**
Wm. Wharton Jr. & Co.

**Track Grinders**
Railway Track-Work Co.

**Trackless Trollicars**
Pierce-Arrow Motor Car Co.
St. Louis Car Co.

**Track, Special Work**
Barbour-Stockwell Co.
Bethlehem Steel Co.
Indianapolis Switch & Frog Co.
Ramapo Ajax Corp.
Wharton, Jr., & Co., Inc., Wm.

**Transfer Tables**
American Bridge Co.

**Transformers**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

**Transmission Towers & Structures**
Amer. Bridge Co.

**Trends, Safety, Stair, Car Step**
Morton Mfg. Co.

**Trolley Bases**
Anderson M. Co., A. & J. M.
Electric Service Sup. Co.
General Electric Co.
More-Jones Brass & Metal Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Ohio Brass Co.

**Trolley Bases, Retrieving**
Anderson M. Co., A. & J. M.
Electric Service Sup. Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Ohio Brass Co.

**Trolley Bases**
Brill Co., The J. G.
General Electric Co.
Westinghouse Elec. & M. Co.

**Trolley Materials**
Electric Service Sup. Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.

**Trolley Shoes**
Economy Elec. Devices Co.
Miller Trolley Shoe Co.

**Trolley Wheels (See Wheels, Trolley)**

**Trolley Wheels, Bushings**
More-Jones Brass & Metal Co.

**Trolley Wheels & Harps**
More-Jones Brass & Metal Co.
Thornton Trolley Wheel Co.

**Trolley Wire**
American Elec'l Works
Amer. Steel & Wire Co.

**Anaconda Copper Mining Co**
Roebling's Sons Co., J. A.
Rome Wire Co.

**Trucks, Car**
Brill Co., The J. G.
Bemis Car Truck Co.
St. Louis Car Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.

**Tubing, Steel**
National Tube Co.

**Tubing, Yellow & Black Flexible Varnishes**
Irvington Varnish & Ins. Co.

**Turbines, Steam**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

**Turbines, Water**
Allis-Chalmers Mfg. Co.

**Turnstiles**
Electric Service Supplies Co.
Perey Mfg. Co., Inc.

**Turntables**
Indianapolis Switch & Frog Co.

**Vacuum Impregnation**
Allis-Chalmers Mfg. Co.

**Valves**
Ohio Brass Co.
Westinghouse Tr. Br. Co.

**Varnished Papers**
Irvington Varnish & Ins. Co.

**Varnish Silks**
Irvington Varnish & Ins. Co.

**Varnishes (See Paints, etc.)**

**Ventilators, Car**
Brill Co., The J. G.
National Ry Appliance Co.
Nichols-Lintern Co.
Railway Utility Co.
St. Louis Car Co.

**Vestibule Linings**
Haskelite Mfg. Co.

**Welded Rail Joints**
Alumino-Thermic Corp.
Electric Ry. Improvement Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Railway Track-work Co.

**Welders, Portable Electric**
Electric Ry. Imp. Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Railway Track-work Co.

**Welding & Cutting Tools**
International Oxygen Co.

**Welding Processes and Apparatus**
Alumino-Thermic Corp.
Elec. Ry. Improvement Co.
General Electric Co.
Indianapolis Switch & Frog Co.
National Ry. Appliance Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse Elec. & M. Co.

**Welding Steel**
Electric Ry. Improvement Co.
Indianapolis Switch & Frog Co.
Railway Track-work Co.

**Wheel Guards (See Fenders and Wheel Guards)**

**Wheel Grinders**
Wheel Truing Brake Shoe Co.

**Wheels, Car, Cast Iron**
Assn. of Mfrs. of Chilled Car Wheels
Griffin Wheel Co.

**Wheels, Car Steel & Steel Tire**
American Steel Foundries Co.
Carnegie Steel Co.

**Wheel Presses (See Machine Tools)**

**Wheels, Trolley**
Anderson Mfg. Co., A. & J. M.
Electric Ry. Equip. Co.
Elec. Service Supplies Co.
General Electric Co.
Gilbert & Sons, B. F. A.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Star Brass Works

**Whistles, Air**
General Electric Co.
Ohio Brass Co.
Westinghouse Tr. Br. Co.

**Wire Rope**
Amer. Steel & Wire Co.
Roebling's Sons Co., J. A.

**Wires and Cables**
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
General Electric Co.
Okonite Co.
Roebling's Sons Co., J. A.
Rome Wire Co.
Standard Underground Cable Co.
Westinghouse Elec. & M. Co.

**Wood Preservatives**
Baker Wood Preserving Co.

**Woodworking Machinery**
Allis-Chalmers Mfg. Co.

# ALPHABETICAL INDEX TO ADVERTISEMENTS


A

| | Page |
|---|---|
| Allison Co., J. E. | 20 |
| Allis-Chalmers Mfg. Co. | 35 |
| Alumino-Thermic Corp. | 41 |
| Amer. Brake Shoe & Fdy. Co. | 51 |
| American Car Co. | 53 |
| American Electrical Works | 30 |
| American Insulating Machinery Co. | 30 |
| American Steel Foundries Co. | 37 |
| American Steel & Wire Co. | 40 |
| Anaconda Copper Mining Co. | 39 |
| Anchor Webbing Co. | 41 |
| Anderson Mfg. Co., A. & J. M. | 34 |
| Archbold-Brady Co. | 21 |
| Assn. of Mfrs. of Chilled Car Wheels | 28 |
| Auto Body Co. | 12 13 |

B

| | |
|---|---|
| Babcock & Wilcox Co. | 41 |
| Barbour-Stockwell Co. | 40 |
| Bates Expanded Steel Truss Co. | 8 |
| Beeler John A. | 20 |
| Bell Lumber Co. | 51 |
| Bemis Car Truck Co. | 45 |
| Bethlehem Steel Co. | 40 |
| Bonney-Vehslage Tool Co. | 42 |
| Brill Co., The J. G. | 53 |
| Buchanan & Layng Corp. | 21 |
| Bureau of Comm. Economics, Inc. | 21 |
| Byllesby Co., H. M. | 20 |

C

| | |
|---|---|
| Cameron Electrical Mfg. Co. | 40 |
| Carnegie Steel Co. | 26 |
| Chillingworth Mfg. Co. | 45 |
| Cleveland Fare Box Co. | 43 |
| Collier, Inc., Barron G. | 22 |
| Consolidated Car Fender Co. | 51 |
| Consolidated Car Heating Co. | 42 |

D

| | |
|---|---|
| Day & Zimmermann, Inc. | 21 |
| Differential Steel Car Co., The | 45 |
| Dixon Crucible Co., Joseph | 35 |
| Drum & Co., A. L. | 20 |

E

| | |
|---|---|
| Earl, C. I. | 45 |
| Electric Equipment Co. | 46 |
| Electric Ry. Equipment Co. | 39 |
| Elec. Ry. Improvement Co. | 40 |
| Electric Service Supplies Co. | 9 |
| English Electric Co. | A |

F

| | |
|---|---|
| For Sale Ads | 46 47 |
| Ford, Bacon & Davis | 20 |
| Fort Pitt Spring & Mfg. Co. | 42 |
| Foster Co., Inc., L. B. | 42 |

G

| | |
|---|---|
| Galef, J. L. | 43 |
| Galena-Signal Oil Co. | 17 |
| General Electric Co. | 18, Back Cover |
| Gilbert & Sons, B. F. Co., A. | 44 |
| Gold Car Heating & Ltg. Co. | 43 |
| Griffin Wheel Co. | 38 |

H

| | |
|---|---|
| Hale Kilburn Co. | 42 |
| Haskelite Mfg. Co. | 37 |
| "Help Wanted" Ads | 46 47 |
| Hemphill & Wells | 20 |
| Heywood-Wakefield Co. | 43 |
| Holst Englehard W. | 20 |
| Hope-Webbing Co. | 41 |
| Hubbard & Co. | 39 |
| Hyman-Michaels Co. | 46 |

I

| | |
|---|---|
| Indianapolis Switch & Frog Co. | 24 |
| Ingersoll-Rand Co. | 49 |
| International Motor Co. | 14-15 |
| International Oxygen Co. | 41 |
| International Register Co., The | 43 |
| International Steel Tie Co., The | 7 |
| Irvington Varnish & Insulator Co. | 41 |

J

| | |
|---|---|
| Jackson, Walter | 20 |
| Jeandron, W. J. | 51 |
| Johns-Pratt Co. | 40 |
| Johnson & Co., Inc. J. R. | 45 |
| Johnson Fare Box Co. | 43 |

K

| | |
|---|---|
| Kuhlman Car Co. | 53 |

L

| | |
|---|---|
| Lackele Steel Co. | 45 |
| Lapp Insulator Co., Inc. | 39 |
| Le Carbone Co. | 51 |
| Lorain Steel Co. | 40 |

M

| | |
|---|---|
| McGuire-Cummings Mfg. Co. | 44 |
| Mica Insulator Co. | 41 |
| Miller Trolley Shoe Co. | 41 |
| Mitchell Rand Mfg. Co. | 33 |
| More-Jones Brass & Metal Co. | 51 |
| Morganite Brush Co. Inc. | 33 |
| Morton Mfg. Co. | 51 |

N

| | |
|---|---|
| Nachod Signal Co. | 40 |
| National Brake Co. | 19 |
| National Pneumatic Co., Inc. | 11 |
| National Ry. Appliance Co. | 42 |
| National Tube Co. | 25 |
| Nichols-Lintern Co. | 43 |
| Nuttall Co., R. D. | 30 |

O

| | |
|---|---|
| Ohio Brass Co. | 5 |
| Okonite Co., The | 39 |
| Ong, Joe R. | 20 |
| Oskel Equipment Co. | 44 |

P

| | |
|---|---|
| Panelyte Co. | 44 |
| Perey Mfg. Co., Inc. | 43 |
| Pittsburgh Testing Laboratory | 42 |
| Positions Wanted and Vacant | 46-47 |

R

| | |
|---|---|
| Railway Audit & Inspection Co. | 21 |
| Railway Track-work Co. | 6 |
| Railway Utility Co. | 42 |
| Ramapo Ajax Corp. | 31 |
| Richey, Albert S. | 20 |
| Robinson Co., Dwight P. | 20 |
| Roebling's Sons Co., John A. | 38 |
| Rome Wire Co. | 22 |
| Rooke Automatic Register Co. | 43 |

S

| | |
|---|---|
| St. Louis Car Co. | 37 |
| Safety Car Devices Co. | 16 |
| Samson Cordage Works | 44 |
| Sanderson & Porter | 20 |
| Scovill Mfg. Co. | 38 |
| Searchlight Section | 46 47 |
| Shaw, Henry M. | 39 |
| Smith Heater Co., Peter | 44 |
| Standard Underground Cable Co. | 38 |
| Star Brass Works | 44 |
| Stevens & Wood, Inc. | 20 |
| Stone & Webster | 20 |
| Stucki Co., A. | 51 |
| Superior Motor Coach Body Co. | 23 |

T

| | |
|---|---|
| Taylor Electric Truck Co. | 45 |
| Thomas Car Works, Perley A. | 36 |
| Thornton Trolley Wheel Co. | 51 |
| Timken-Detroit Axle Co. | 29 |
| Tool Steel Gear & Pinion Co. | 38 |
| Transit Equipment Co. | 46 |

U

| | |
|---|---|
| Universal Lubricating Co. | 42 |
| U. S. Electric Signal Co. | 40 |

W

| | |
|---|---|
| "Want Ads | 46 47 |
| Wason Mfg. Co. | 53 |
| Westinghouse Elec. & Mfg. Co. | 2, 3 |
| West'gh'se Traction Brake Co. | 10 |
| Wheel Truing Brake Shoe Co. | 44 |
| Wheeling Corrugated Co. | 36 |
| White Eng. Corp., The J. G. | 20 |
| Wharton, Jr. & Co., Inc., Wm. | 34 |
| White Eng. Corp., The J. G. | 20 |
| Wish Service, The P. Edw. | 21 |
| Wood Co., Chas. N. | 39 |

# This is the Steel Age



# Kuhlman Type "G" Steel Bodies

**Safety, Durability and Full Vision Are Features of Latest Development in City Coaches**

Progressive development in body design is responsible for the new Kuhlman Type "G" City Coach. Another step forward has been made, resulting in this full and practically unobstructed vision design which, with its steel construction, represents more than any other type developed to date the ultimate and most practical design of motor bus body for public conveyance.

**To be modern, it must be steel.**

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

AMERICAN CAR CO. ST. LOUIS MO. — G.C. KUHLMAN CAR CO. CLEVELAND, OHIO. — WASON MANF'G CO. SPRINGFIELD, MASS.

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA



# Performance Wins Again

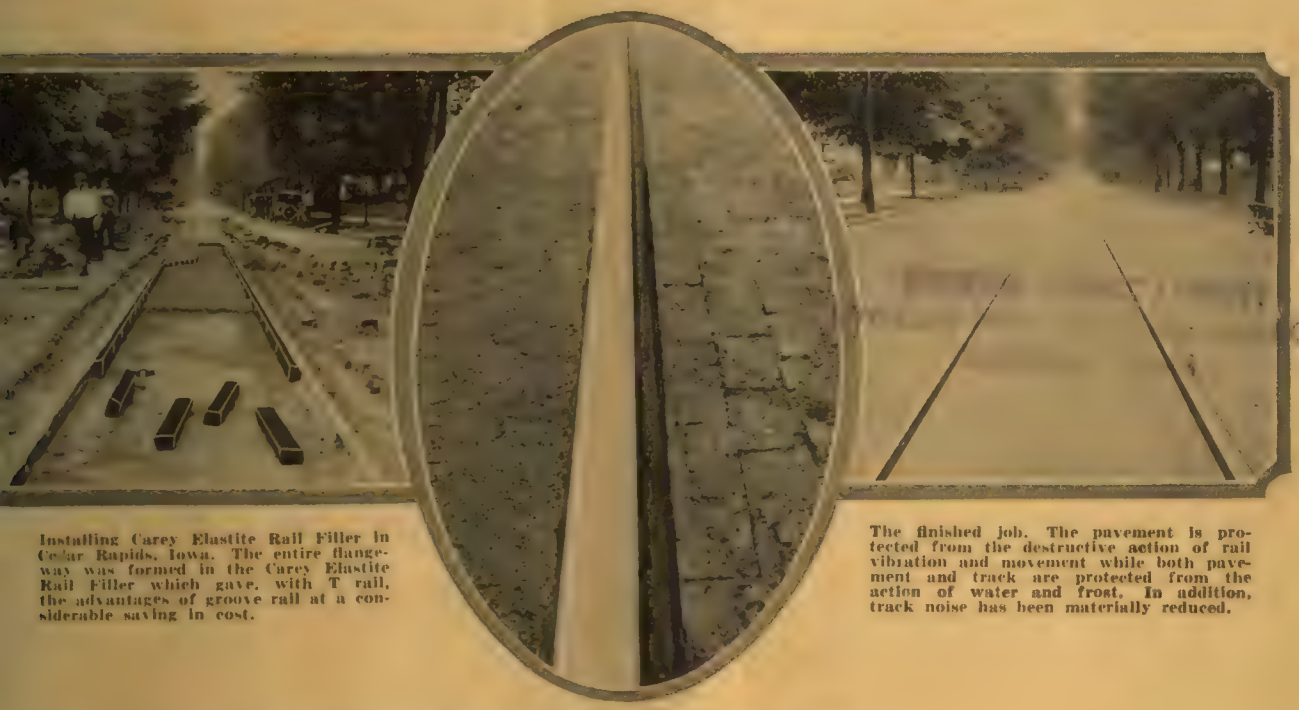
The successful operation of 5 trolley buses in Rochester, N. Y., was sufficient recommendation for adding 4 more buses—G-E Motors and Control again specified.

25-250

General Electric Company
Schenectady, N. Y.
Sales Offices in all Large Cities

w-Hill Company, Inc. November 8, 1924 Twenty Cents Per Copy

# ELECTRIC RAILWAY JOURNAL



Installing Carey Elastite Rail Filler in Cedar Rapids, Iowa. The entire flangeway was formed in the Carey Elastite Rail Filler which gave, with T rail, the advantages of groove rail at a considerable saving in cost.

The finished job. The pavement is protected from the destructive action of rail vibration and movement while both pavement and track are protected from the action of water and frost. In addition, track noise has been materially reduced.


## A *water-tight* track!

Fitted tightly against the head, web and base of the rail and bonding with the pavement, Carey Elastite Rail Filler seals the track against the entrance of water and frost. By absorbing rail vibration and other movement it *keeps* the track water-tight. Pavement does not disintegrate. Water does not get through to undermine the track and paving. The rail is protected from rust and scale.

Here is a tremendous advance in track-construction which solves the most pressing problems of track installation and maintenance. Water-seepage and frost-action cause most of the injury to track and paving that piles up repair costs.

The cost of Carey Elastite Rail Filler compares favorably with grout and brick fillers and it is as durable and lasting as the rail itself. Write for sample, information and prices.

THE PHILIP CAREY COMPANY
53 Wayne Ave., Lockland, Cincinnati, O.

### Elastite Rail Filler

Carey Elastite Rail Filler is an asphaltic material easily installed forming a resilient cushion between the rail and the pavement, making a water tight joint, absorbing rail vibration and traffic impact and reducing track-noise. It is preformed to fit any rail section and is readily bent on the job to fit any curve. It is unaffected by moisture or temperature changes and is enduring under all service conditions.

Carey Elastite
NAME REG. U.S Patent Office
RAIL FILLER





Multiple-Unit Train of the Long Island Railroad

Each Car Equipped with Two Type 308 Motors, 215 hp. each, and Electric Pneumatic Control.

The Long Island Railroad is extending its electrification approximately twenty miles to Babylon, in order to more efficiently handle the tremendous traffic in and out of New York City, which traffic has increased over 450% since 1905.

The order for the complete substation equipment for this extension, consisting of ten rotaries with their transformers and switching equipment, has been placed with the Westinghouse Electric and Manufacturing Company.

In addition, 40 motor-car equipments have been purchased, making a total of 638 Westinghouse multiple-unit equipments available to assist the Long Island Railroad maintain 100% service.

Westinghouse Equipment Leads the Way.

**Westinghouse Electric & Manufacturing Co.**
**East Pittsburgh, Pennsylvania**
Sales Offices in All Principal Cities of the United States and Foreign Cities

MEMBER AERA

W WESTINGHOUSE ELECTRIC

# Westinghouse

*Vol. 64, No. 19* New York, November 8, 1924 *Pages 793-828*

# ELECTRIC RAILWAY JOURNAL

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

MORRIS BUCK, Associate Editor
C. W. SQUIER, Associate Editor
JOHN A. MILLER, JR., Assistant Editor
G. J. MACMURRAY, News Editor
CHARLES GORDON, Western Editor, Old Colony Bldg., Chicago
MERRILL B. KNOX, Editorial Assistant, Old Colony Bldg., Chicago
CARL W. STOCKS, Associate Editor

## CONTENTS

**Editorials** ..... 793

**Supervisory Controlled Substation on Chicago Elevated** 795
BY DWIGHT L. SMITH.
New substation at junction with North Shore line controlled by power supervisor in general offices in Edison Building—2,000-kw. machine has full automatic features.

**Automatic Rear Exit Doors on Toronto Rebuilt Cars**....799
Sixty former two-man cars are being arranged for one-man operation by installation of automatic doors at rear. Passengers will enter at front end only, but may leave at either end.

**Changing Knockers Into Boosters**..... 800

**Romance of Power Depicted**..... 800

**Sleeping Car Service Begun by Interstate Public Service Company** ..... 801
Extra long berths, with windows alongside uppers, large washrooms, and easy riding qualities are features of three sleeping cars placed in service between Indianapolis and Louisville.

**Recent London Underground Advertising Posters**..... 804

**Analysis of New York Surface Transportation**..... 806

**Duplicate Signal Protects Blind Curve**..... 807

**The Readers' Forum** ..... 807

**Association News and Discussions** ..... 808

**New Englanders Resume Activities**..... 808

**Reducing Maintenance Costs**..... 808
BY W. C. BOLT.

**Seven Kinds of Bus Operation**..... 810
BY A. E. POTTER.
United Electric Railways of Providence has already undertaken five different classes of service. Direct profit is not expected. Chartered buses are good revenue producers.

**Obtaining Longer Life from Motor Bearings**..... 811
BY H. N. RANSOM.
Important maintenance considerations include keeping bearings tight in housings or motor frames, keeping out dirt and water and providing a moving oil film in bearings.

**Obstruction Is Necessary to Real Progress**..... 813
BY ROBERT H. NEWCOMB.
At the risk of being considered reactionary railway men in New England oppose bus operation where this would duplicate existing service.

**American Association News** ..... 813

**Maintenance of Equipment** ..... 814

**News of the Industry** ..... 817

**McGraw-Hill Company, Inc., Tenth Ave. at 36th St., New York**

JAMES H. McGRAW, President
ARTHUR J. BALDWIN, Vice-President
MALCOLM MUIR, Vice-President
E. J. MEHREN, Vice-President
MASON BRITTON, Vice-President
JAMES H. McGRAW, JR., Vice-Pres. and Treas.
C. H. THOMPSON, Secretary

WASHINGTON: Colorado Building
CHICAGO: Old Colony Building
PHILADELPHIA: Real Estate Trust Building
CLEVELAND: Leader-News Building
ST. LOUIS: Star Building
SAN FRANCISCO: 883 Mission Street
LONDON: 6 Bouverie Street, London, E. C. 4

Member Associated Business Papers, Inc.
Member Audit Bureau of Circulations

1924

Cable Address: "Machinist, N. Y."

Publishers of
*Engineering News-Record*
*American Machinist*
*Power*
*Chemical and Metallurgical Engineering*
*Coal Age*
*Engineering and Mining Journal-Press*
*Ingeniería Internacional*
*Bus Transportation*
*Electric Railway Journal*
*Electrical World*
*Electrical Merchandising*
*Journal of Electricity*
*(Published in San Francisco)*
*Industrial Engineer*
*(Published in Chicago)*
*Electrical Retailing*
*(Published in Chicago)*
*American Machinist—European Edition*
*(Published in London)*

The annual subscription rate is $4 in the United States, Canada, Mexico, Alaska, Hawaii, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, Colombia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brazil, Spain, Uruguay, Costa Rica, Ecuador, Guatemala and Paraguay. Extra foreign postage to other countries $3 (total $7 or 29 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid to any part of the world, 20 cents.
Change of Address—When change of address is ordered the new and the old address must be given, notice to be received at least ten days before the change takes place.
Copyright, 1924, by McGraw-Hill Company, Inc.
Published weekly. Entered as second-class matter, June 23, 1908, at the Post Office, at New York, under the Act of March 3, 1879. Printed in U.S.A.

## *Illustrations*

A FEATURE that always has characterized the ELECTRIC RAILWAY JOURNAL is the excellence of the pictures, diagrams and maps that illustrate both the technical articles and the news. The great quantity of this illustrative material that goes into the paper is seldom realized, even by those readers who have had occasion to comment on it. For instance, a recent issue of the paper contained 24 halftones and 16 line cuts—a total of 40 illustrations. The issue of Sept. 20 contained 64 halftones and 15 line cuts, 79 in all.

A recent analysis shows that this great mass of illustrative material is handled by our illustration department in an average time of 3½ days, as compared with other weekly periodicals which take from 12 to 15 days for similar work—and without sacrifice of quality.

This is but another example of ELECTRIC RAILWAY JOURNAL service, which gives its readers the latest and best industry information with almost daily newspaper speed.

Number of Copies Printed, 6,200

Advertising Index—Alphabetical, 50; Classified, 46, 48; Searchlight Section, 44-45

# Supervisory Control



## —to meet every operating demand!

THREE systems of supervisory control have been designed by the Westinghouse Company which meet all operating requirements. These systems are as follows:

1 Audible Type—Especially adapted to the control of remotely operated automatic hydro-electric and small switching stations.

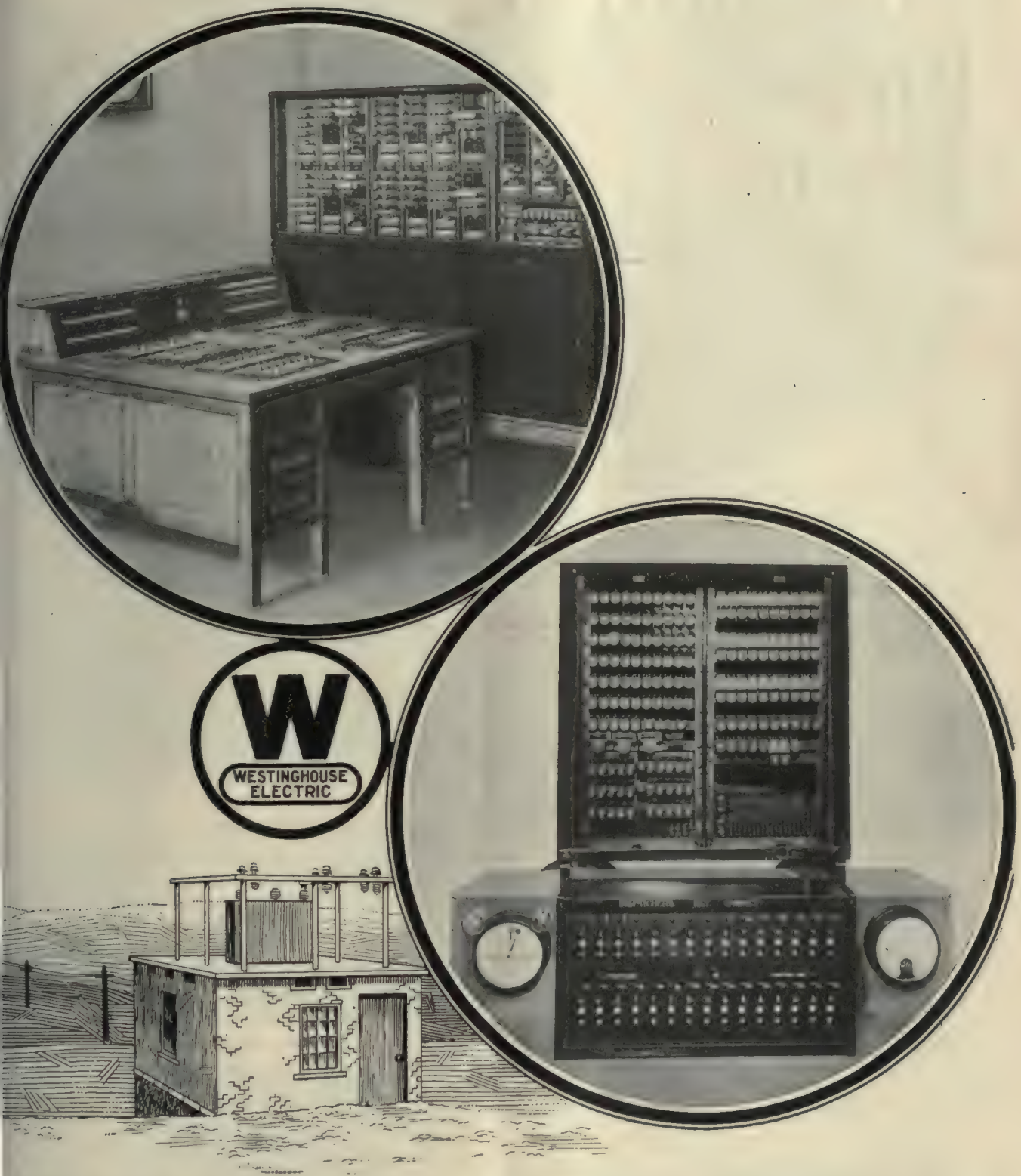
2 Code Visual Type—Primarily designed for long distance operation over lines subject to inductive interference.

3 High Speed Visual Type—Designed especially for operation of large urban substations requiring high speed results, remote load indications and remote synchronising.

Write for Circular 1694-A and supplement.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of the United States and Foreign Countries

# Westinghouse




Westinghouse

# "Popularizing Electric Railway Service"

This is factor number one in determining the annual Coffin Prize award.

"Popularizing electric railway service"—what can help more than well maintained track? Only on well maintained track can even your newest cars give maximum safety, speed, silence and comfort comparable with rubber tire competition.

Only by adequate welding and constant rail grinding to eliminate incipient corrugation and maintain non-pounding joints can you maintain track in prime condition.

What's more, there's distinct economy in good welding and grinding. It keeps maintenance costs down. Here is the approved equipment for the job.

*Write for a quotation.*

**Railway Track-work Co.**

3132-48 East Thompson Street, Philadelphia

AGENTS:
Chester F. Gailor, 30 Church St., New York
Chas. N. Wood Co., Boston
Electrical Engineering & Mfg. Co., Pittsburgh
Atlas Railway Supply Co., Chicago
Equipment & Engineering Co., London

(329)



"Reciprocating" Track Grinder



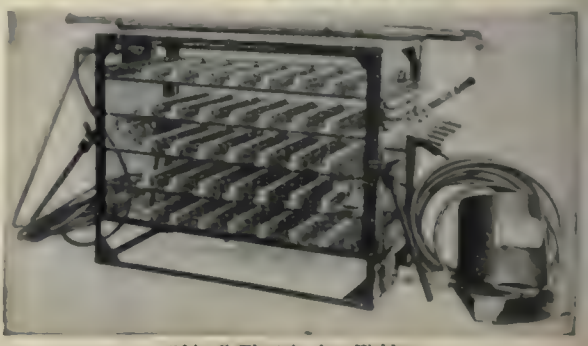
"Universal" Rotary Track Grinder



"Atlas" Rail Grinder



"Hercules" Swing Frame Rail Grinder



"Ajax" Electric Arc Welder




# Get the Last 10%, too!

When you buy rail bonds are you getting the full limit of care that can be put into their manufacture? Are you getting the last 10%?

It's the last 10% attention to manufacturing detail that develops the full possibilities in O-B Bonds. Instead of average results, you have extra returns that show themselves in day-after-day installation and operating performance—in records of more efficient rail conductance.

Your order for O-B Bonds is the first step to 100% bonding.

**The Ohio Brass Co.**
**Mansfield, Ohio, U.S.A.**

TROLLEY MATERIAL — ELECTRIC RAILWAY CAR EQUIPMENT — RAIL BONDS — HIGH TENSION PORCELAIN INSULATORS — THIRD RAIL INSULATORS

NEW YORK — PHILADELPHIA — PITTSBURGH CHICAGO — CHARLESTON, W. VA. LOS ANGELES — SAN FRANCISCO — PARIS, FRANCE

Dominion Insulator & Mfg. Co., Limited Niagara Falls, Ontario, Canada

# *Modern Signal Protection*



Electro-Pneumatic Interlocking at Terminal Station of Philadelphia & West Chester Traction Co.

At the new Philadelphia Terminal Station of the Philadelphia & West Chester Traction Co., UNION ELECTRO-PNEUMATIC INTERLOCKING allows car movements to be speeded up and insures against confliction of simultaneous movements.

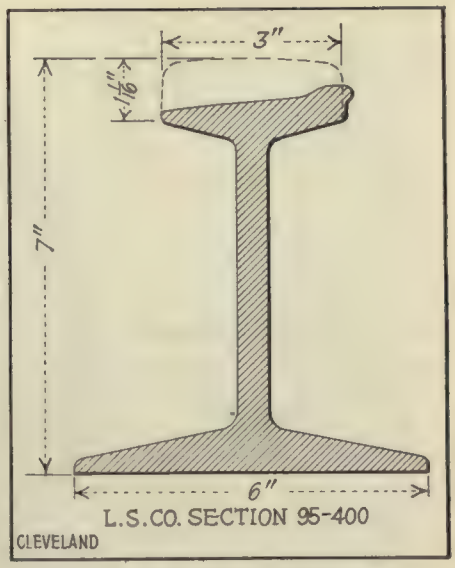
*Let one of our engineers study your operating conditions and co-operate with you in considering what Interlocking and Automatic Block Signals will do for your Railway.*

Trade Mark

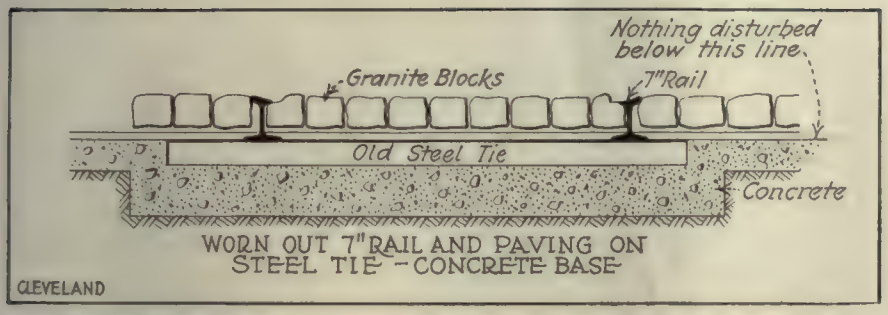
## Union Switch & Signal Co.

SWISSVALE, PA.

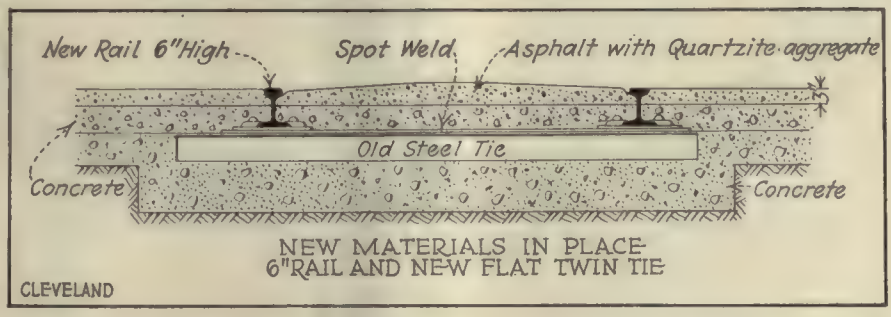
Trade Mark




Cross Section of Rail on Euclid Ave., Cleveland, Showing Wear on Ball of Rail




Cross Section Showing Details of Track Construction on Euclid Avenue, Cleveland. Rail Worn Out, Concrete Base Still in Good Condition.




Details of method of Replacing Rail on Old Concrete Base, Using Special Flat Steel Twin Ties.

# Low Cost Construction that Outlasts the Rail

The most startling development in track construction for paved streets has been successfully worked out during the past two years in the renewal of rail and paving on a Steel Tie Concrete Base.

Planning your new paved track for renewal by using Steel Twin Tie Construction will require no large investment in initial cost. Our definite cost records for 1924 show costs as low as $8.35 per single track foot for the track complete, including removal of the old construction and concrete paving surface.

For conservative-minded executives who have questioned the comparative life of concrete construction there is a complete answer in the reconstruction of such track at the end of a satisfactory rail life in Cleveland and elsewhere.

In planning 1925 paved track construction investigate the low cost paved track construction that outlasts the rail with all assurance that asking us to present all the data by personal call or in the mail will involve no persistent or annoying solicitation.

**The International Steel Tie Co., Cleveland, Ohio**

# Steel Twin Tie Track

## Economical — Permanent — Renewable



# The WABCO Smile

A sense of satisfaction comes to all those who have experienced the benefits of WABCO Brake Cylinder Packing Cups.

The motorman feels secure in knowing that the air he puts into the cylinder will stay there to provide the degree of car control that he intends. No air can pass *through* WABCO cups, and they cling to the cylinder walls so tightly as to prevent leakage *around* them.

The shop man knows that his work of maintaining brake cylinders is lessened because WABCO cups do not need frequent replacement. They retain their effectiveness over very long periods even under severe service conditions. Neither do compressors come in so often for overhauling as they are not overworked to maintain cylinder leakage.

Moreover, the man who pays the bills is pleased with the economical advantages that follow the adoption of WABCO cups. They function better and wear longer, saving operating and maintenance expense.

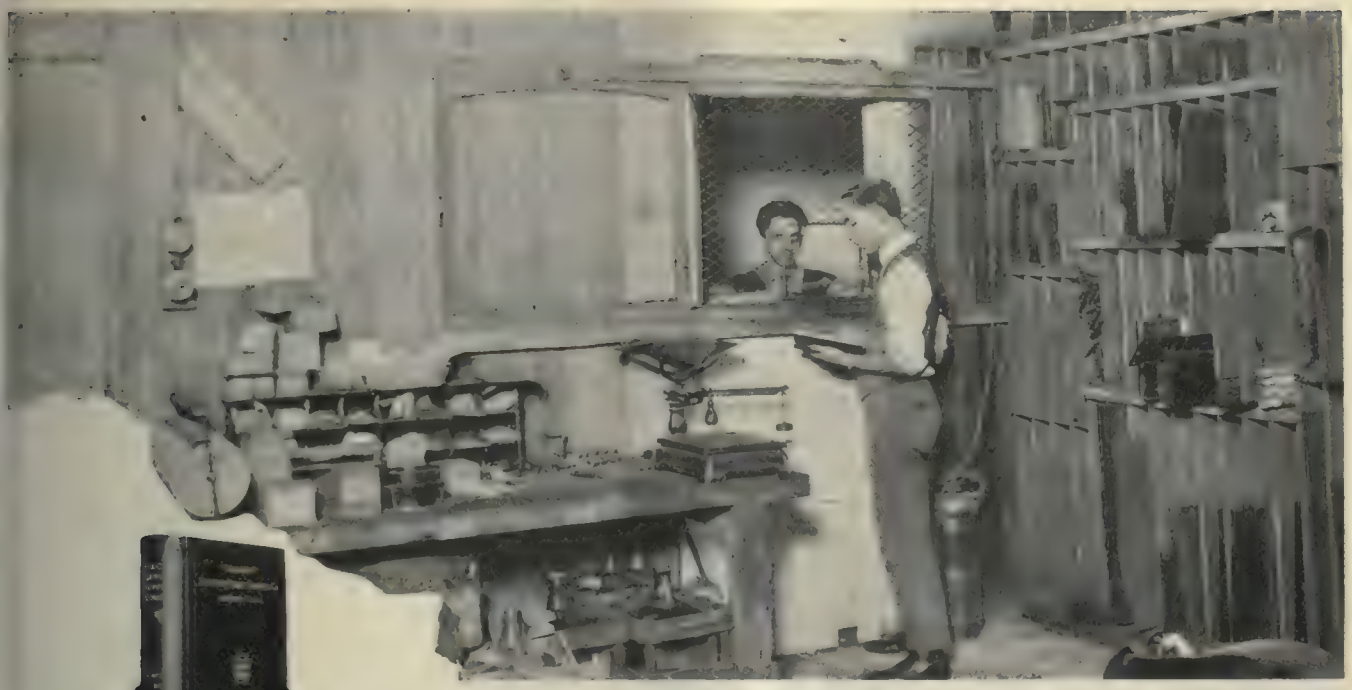
WABCO

**WESTINGHOUSE TRACTION BRAKE CO.**

General Office and Works: WILMERDING, PA.

2141

# WESTINGHOUSE TRACTION BRAKES





*—most all storekeepers use this book!*

**Some Sample Items**

Steel Gear Cases
Motormen's Seats
Lighting Fixtures
Headlight Resistances
Air Sanders
Trolley Catchers
Shelby Trolley Poles
Rotary Gongs
International Fare Registers
Fare Register Fittings
Samson Cordage
Air Valves
Cord Connectors
Trailer Connectors
Automatic Door Signals
Standard Trolley Harps
Standard Trolley Wheels
Segur Coil Winding Tools
Peerless Armature Machines
Insulating Materials
Cass Commutator Stones
Sand Driers
Peerless Pinion Pullers
Employees' Badges
Line Material
Portable Lamp Guards

# It's the ESSCO CATALOG No. 7

A veritable gold mine of information for the man who has to handle, use, install or purchase car and shop equipment. Countless illustrations, big, clear, instructive. Hundreds of pages of descriptions, dimensions, ratings, capacities.

There are suggestions in this book for the man who does some thinking about his job. It will help him to keep *up-to-date* on the maintenance of the modern car. The complete index alone, is a valuable feature.

*Do you use your copy?*




ELECTRIC SERVICE SUPPLIES CO.

PHILADELPHIA 17th and Cambria Sts.
PITTSBURGH 829 Oliver Building
NEW YORK 50 Church St.
SCRANTON 316 N. Washington Ave.
CHICAGO Monadnock Bldg.
BOSTON 88 Broad St.
Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver

# International

## Announces a Book of Information

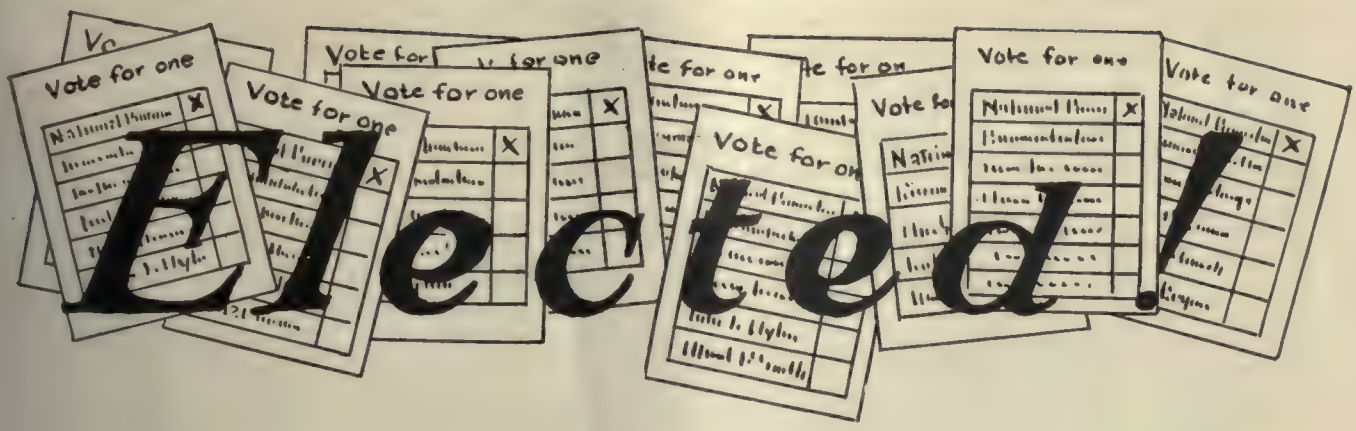
— on —

## Creosoted Pine Poles




**Write for Your Copy NOW!**

Free on request. It contains data and information of value to pole users.




# By an avalanche of votes

OVER eighty percent of all the electric railway companies in the country have marked their ballots for "National Pneumatic." All of these roads have cars equipped with one or more National Pneumatic Devices. The established reputation and time-tried satisfactory service of N-P equipment challenges any comparison, and any test. You're "safe" if you check "National Pneumatic" on all specifications.

## NATIONAL PNEUMATIC

Door Engines
Door Operating Mechanisms
Manual, Pneumatic or Electric Control
Automatic Doors
Motorman's Signal Lights



**National Pneumatic Co., Inc.**

*Originators and Manufacturers*

***Executive Office:* 50 Church St., New York**

Philadelphia—1010 Colonial Trust Bldg. Chicago—940 McCormick Bldg.
General Works—Rahway, New Jersey
*Manufactured in Canada by*
Dominion Wheel & Foundries, Ltd., Toronto, Ont.



**Western Red Cedar**

**Light, Durable and Strong Plain or Treated Poles**

**Northern White Cedar**





## Increasing the Span of Life

That replacements might be reduced to a minimum, that we may add still more years to the already long life of the cedar pole.

That's the work so successfully undertaken by the Department of Research and Preservation of the National Pole Company.

## *What has been the measure of their success?*

NPCo

This stamp on the butt of every pole identifies and guarantees it as National Pole Quality.

They have developed the most effective processes of preservation known. They have lifted the National *treated* pole out of the class of the average. They have set new standards of service life and so perfect is their product that we have branded every National pole with the date of the year of treatment. How long will they last — time alone will tell.

# NATIONAL POLE COMPANY

**Escanaba, Michigan**

*Distributors:*
*Western Electric Company*








**FIFTH AVENUE BUSES**

**Type L**

55 passengers

Short wheel base

Less than 14 feet high with top included

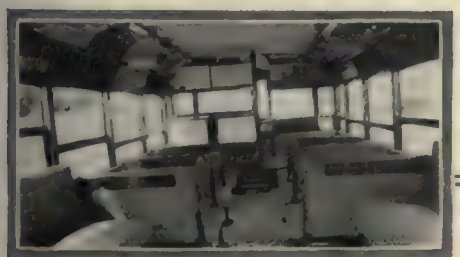
# Super-Service

One thing was clear to every visitor at the recent A.E.R.A. Convention. Of the dozens of buses shown, mostly beautiful parlor and de luxe types, this Fifth Avenue Bus stood out pre-eminently as the practical, multiple passenger carrier. Its increased seating capacity, its sensible every-day working style of design and construction and its short wheel base demonstrate its serviceability. Back of every Fifth Avenue Bus there stands a record of established performance and proved durability under heaviest traffic and most arduous transportation conditions in New York.

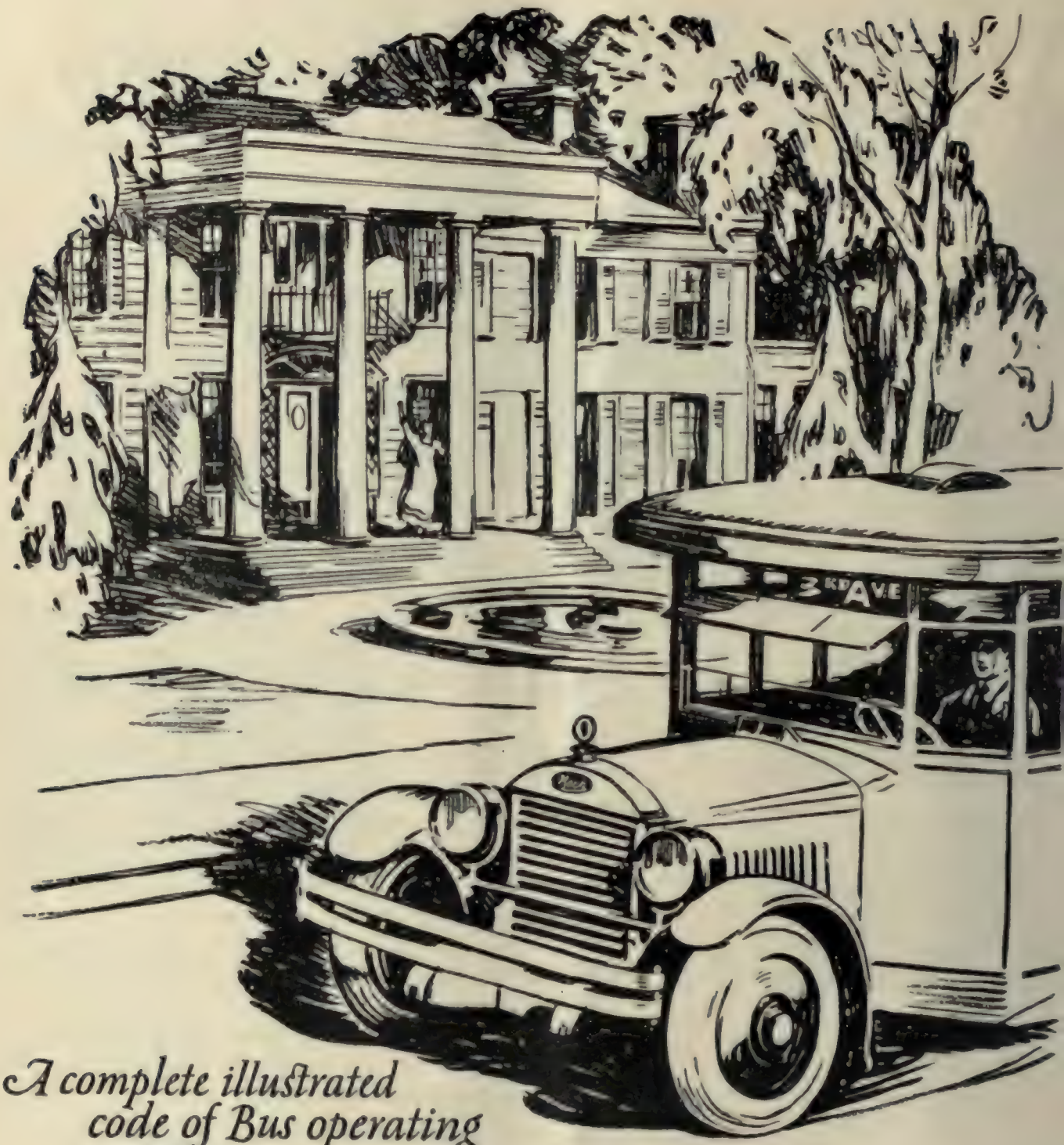
Here is an opportunity to give not merely bus service, but super-service. The Fifth Avenue Bus is the bus in which to carry the crowds.

***On an attractive price basis!***

Fifth Avenue Double-Deckers are not costly products. The prices quoted for a 55-passenger Type L compares favorably with those of much lower capacity single-deck vehicles.



NEW YORK TRANSPORTATION CO.
New York, N.Y.




# *A complete illustrated code of Bus operating practice*

**In other words a 250-page manual that should be in the hands of every railway now operating buses or contemplating bus service.**

**BUS OPERATION PRACTICE is a real treatise; an engineering, legal and service reference book. Chapters cover such important topics as: Establishing the Service, Picking Profitable Lines, Securing the Right to Run, Incorporating the Company, Physical Property, Operating Staff, Selling the Service, Establishing Public Relations, Making Good on Schedules, Operation, Figuring Profits.**

**Each topic has been covered by a specialist in that particular phase of bus operating practice. Mack has thoroughly canvassed the field for you and presents this wealth of vital information between book covers.**

**Get your request in for a copy.**

# Where Residential restrictions *prohibit* tracks —

Residential communities are friendly toward the modern bus. The quietness of the pneumatic tire, the graceful sweeping body lines, and the general tone of the vehicle as a whole win friends in the most select districts.

And a friendly patronage usually means a paying service.

Mack low one step buses swing along with a graceful, safe road-hugging motion, that *fits any picture.*



Mack bus engineers gave much thought to the outward lines when they planned the Mack. And in the Mack factories skilled craftsmen give the final touch. Mack manufacturing control is absolute.

The Mack bus is all bus from bumper to tail-light.

A sturdy long-life Mack engine.

A specially designed low bus chassis.

Wide front axle, assuring safety and permitting a short turning radius.

Mack dual reduction drive axle especially designed to give maximum road and underbody clearance.

Mack transmission with ground gears.

Dual system of brakes on wheels and drive shafts.

Mack shock insulator (featuring spring ends embedded in rubber shock insulator cushions).

The Mack Street Car Body.

Railways, everywhere, are solving many of their transportation and financial problems by enlisting the Mack as their ally. Sixty-seven per cent of Mack bus deliveries so far this year have been to railway companies.

MACK TRUCKS, INC.

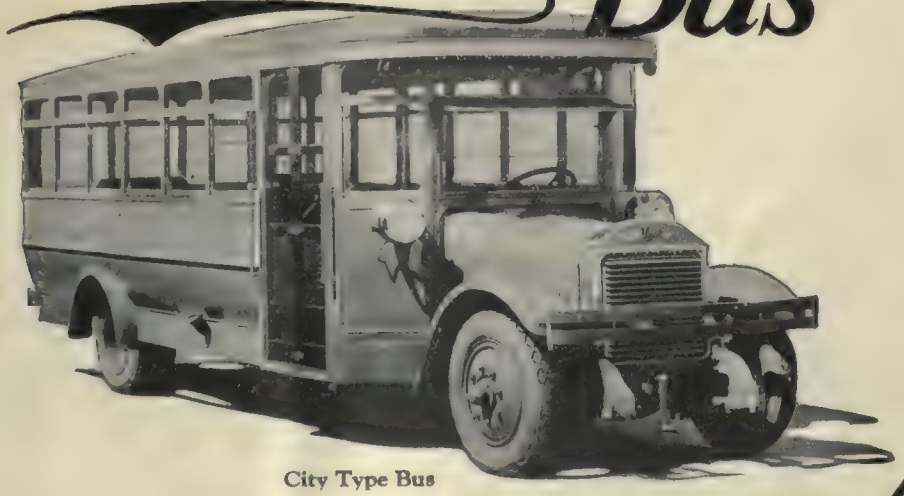
INTERNATIONAL MOTOR COMPANY

25 Broadway New York City

*Builders of City and Sedan Type Buses*

Eighty-three direct factory branches operate under the titles of: "MACK MOTOR TRUCK COMPANY" and "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION."

## The Mack Bus



City Type Bus

*Performance counts!*

# *Assured profits* from extension and feeder service



*Some Recent Purchasers of*

**PIERCE-ARROW BUSSES**

Albany—Capital District Transportation Co.; New York Central Railway Co.
Pittsburgh—Monongahela West Penn Public Service Co.; Equitable Auto Co., for Beaver Valley Motor Coach Co.; Pittsburgh Railways.
Providence—United Electric Railway Co.
Milwaukee—The Milwaukee Electric Railway & Light Co.
New Haven—Connecticut Company.

The modern, six-cylinder Pierce-Arrow Motor Coach has solved the problem of extension and feeder service for electric railways.

This handsome, luxurious coach that glides smoothly, noiselessly and without vibration, attracts a wider range of patronage. Passengers are eager to ride in it because it is actually more comfortable than a fine limousine and assures a swift, safe, economical ride.

The remarkable speeds that can be maintained with safety mean more trips per day—more fares—more profits. The ease of control is an important safety factor in eliminating driver fatigue. Gear shifting is seldom necessary. Steering and brake operation are easy. All the smoothness and flexibility of a high-powered touring car are available.

Slow depreciation, freedom from high maintenance expense, ability to earn profits consistently over a long sustained period of time, are assured by the well known Pierce-Arrow qualities of permanence and reliability.

Our engineers will be glad to demonstrate this modern motor coach and to discuss with railway representatives the facts regarding its transportation ability. Complete information will be furnished on request.

THE PIERCE-ARROW MOTOR CAR COMPANY
Buffalo, N. Y.

## Standard Chassis
## $4600

for 196-inch wheelbase, $4750 for 220-inch wheelbase, at Buffalo; including starter, battery, generator, solid tires and electric lights. Pneumatic tires and disc wheels optional at extra cost. Either chassis will accommodate the Sedan, sight-seeing or pay-enter types of wood or steel bodies, ranging from 18-passenger capacity upward.

*Terms if desired*

## The Pierce-Arrow 6-Cylinder Bus Engine

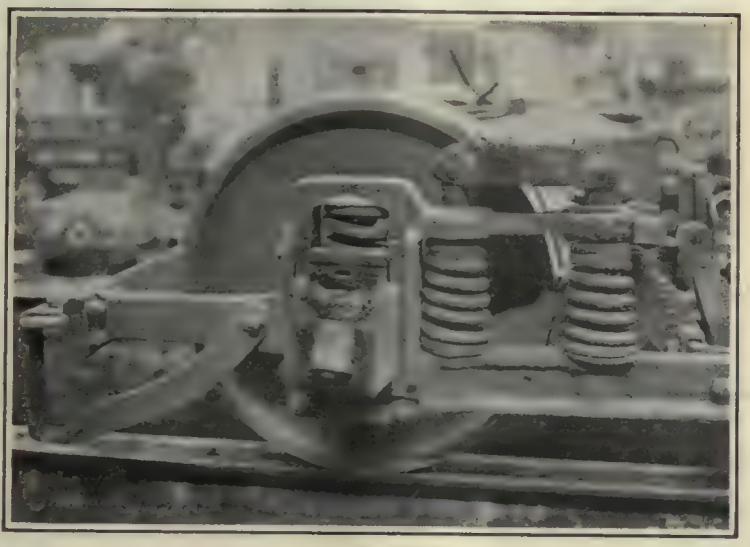
The silent, dual-valve, dual-ignition Pierce-Arrow bus engine develops over 100 horsepower at 2500 revolutions per minute. It is so flexible that gear shifting is reduced to a minimum.

The bus is propelled by a trouble-free inverted worm-gear drive. The low-hung chassis has an unusually short turning radius.

# PIERCE ARROW

# SIX-CYLINDER MOTOR BUSSES

# Galena Oils and Service



## Look at this journal box!

The cover cap is gone. The waste isn't packed right. It's full of dirt and grit. Hot boxes, worn journal bearings and other troubles would be rampant if this condition was general.

But a defective journal box like this is easily spotted. It is a very obvious trouble. Anyone can notice and correct it.

But there are many "hidden" losses in electric railway lubrication—losses in power and depreciation through excessive friction. Unsuitable oils will cause excess fuel consumption, involving a money value much greater than the cost of lubricants.

Galena Oils and Service prevent or minimize the hidden as well as the obvious losses of lubrication. Their installation is a literal assurance of lower maintenance costs as well as better lubrication efficiency.

## Galena-Signal Oil Company

New York • Franklin, Pa. • Chicago

and offices in principal cities

**Standard for Modern G-E Motors as follows**

| | |
|---|---|
| GE-201 | GE-260 |
| GE-203 | GE-263 |
| GE-210 | GE-264 |
| GE-240 | GE-265 |
| GE-247 | GE-275 |
| GE-258 | |

**—and available for these G-E Motors**

| | |
|---|---|
| GE-57 | GE-73 |
| GE-67 | GE-80 |
| GE-70 | GE-88 |




*Don't purchase supplies at random. Use your G-E Catalog*

# A Renewable Carbon-way

Do you replace worn brush-holder carbon-ways promptly as you should? Or do you continue operation with the worn part and risk a higher motor maintenance cost?

Many railway motors now in service have worn brush-holders that should be replaced. Replace them now with the new G-E Renewable Carbon-way Holder. Then in the future just the carbon-way, the worn part, can be renewed at about one fifth the cost of replacing a complete holder.

Quite a saving. And remember, the other results will be fewer motor failures and better service.

**General Electric Company**
Schenectady, N. Y.
Sales Offices in all Large Cities

GENERAL ELECTRIC

New York, Saturday, November 8, 1924

# Electric Railway Journal

*Consolidation of Street Railway Journal and Electric Railway Review*

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

*Volume 64*
*Number 19*

## Now We Can Go Ahead Confidently

THE election of President Coolidge will be generally acceptable to electric railway men. On several occasions the President has shown his interest in the welfare of the electric railway industry, and while vice-president he was one of the speakers at the 1923 Midyear Meeting in Washington. But it is not only as a personal matter that President Coolidge's success at the polls may be welcomed. The hearty indorsement given to his policies in the election by the country at large shows that the majority of the people are conservative and have not been misled by the radical arguments of recent years.

It should not be forgotten that government ownership and operation of railways and other public utilities was one of the policies advocated by the party which carried but one state at the election on Tuesday. It also must not be forgotten that a most convincing reply to this policy of government ownership was broadcasted from Washington about five weeks before the election by Secretary of Commerce Hoover and published in full at the time in ELECTRIC RAILWAY JOURNAL. It must not be forgotten that the decisive defeat of Mr. La Follette also removes all cause to fear that the United States Supreme Court may be made subservient to the Congress.

Not the least of the good results of the election is the probability that we shall continue to have the services in high office of such men as Hoover and Mellon. This insures another four years of "more business in government and less government in business."

Altogether Mr. Coolidge's election and Mr. La Follette's thorough defeat means that we can go ahead with the business of public service, having full confidence that the rights of property will be inviolate and that honest private operation will not be menaced and strangled by a drive for socialism. The country has spoken unmistakably. It does not want any change in our form of government. It does not want socialism.

## More Attention to Tiring Will Save on Re-Tiring

IT SEEMS to be a very general condition now that the purchaser of motor buses gives little if any consideration to the size and type of tires with which the new vehicles are to be equipped. Likewise, the chassis manufacturer is not too particular about what he puts on, in the absence of definite specifications. This leads to much dissatisfaction with the tires and produces high operating costs, for the tire item is one of the principal expenses in motor bus operation.

The manufacturer of tires is particularly interested in this situation, for he realizes that if a wrong size and type of his tires are placed on a bus the user is likely to feel that he had better choose a different make when he has to re-tire. One prominent tire engineer found pleasure at the number of tires of his own make with which buses at the Atlantic City convention were equipped, but was greatly disappointed at the fact that on many of these buses either the wrong size or the wrong type of his tire had been applied.

Tire manufacturers say that they have been unable thus far to arouse sufficient interest in this detail of equipment. This is naturally a condition which accompanies the newness of the use of buses. Tire manufacturers also say that their offers of advice by engineers who have made tire manufacture their life work have not been at all well received by bus operators. The latter have looked upon all such proffers of service as being merely sales schemes. While such an engineering service is, of course, an indirect approach to the later sale of tires, it is difficult to see why railway men should not accept the engineering services of these firms, just as they have learned to rely upon the engineering services of the manufacturers of railway equipment. Perhaps the tire manufacturers must go through a certain period of effort in establishing confidence, but surely the question of getting the proper tires on a bus is a matter of considerable importance.

## Street Railway Not Inherently Faulty in New York Situation

WITH the many applicants fighting to obtain franchises for bus operation in New York City, the situation of the street railways is commonly looked upon as hopeless. Perhaps the situation is hopeless—if present politics and present operating methods are to continue. But this is so only if these conditions do continue, and not because of any inherent weakness in the electric rail system as compared to any newer form of transportation now available.

New York City street railway operation, excluding Brooklyn lines, does not represent modern railway practice. The equipment in use is old and inherently slow. Even this old equipment is not operated as well or as rapidly as it could be. With their lackadaisical running and discourtesy, Manhattan trainmen have inspired much adverse criticism of the street car. They have given some cause for the idea prevalent that it is a back number.

A brief analysis on page 806 shows some of the troubles of the street railways in New York. One is that the speed of cars averages only 7.16 m.p.h. In Chicago the street cars are averaging nearly 11 m.p.h. That high figure cannot be attained in Manhattan, but

it is believed that 8 to 8.5 m.p.h. would be possible with modern cars designed for rapid loading and unloading and fast acceleration, and manned by well-schooled and disciplined trainmen. This would mean not only a large saving in operating expenses but would attract great numbers of short-haul riders who now make nearly as good time walking. The demand for street car service is certainly not lacking, as is evidenced by the high average car-mile earnings in Manhattan, which are about 70 cents as compared with 45 cents for the country as a whole. In fact, today, as pointed out in the annual report of one of the railways, page 822, the New York surface lines are carrying a larger proportion of the total number of passengers carried on surface, elevated and subway lines than at any time since the subways started. The use of street cars in recent years has increased faster than the use of subway and elevated lines.

Another of the troubles is that the street cars have average receipts of only 3.5 cents per passenger-mile, while the buses, both Fifth Avenue and municipal, get some 5.5 cents per passenger-mile. Were the Manhattan and Bronx railways receiving the same revenue per passenger-mile as the buses, which would be equivalent to an 8-cent fare, their receipts would be increased 57 per cent. Their net earnings would go up from $3,489,000 to $19,800,000. This would give a return of 22 per cent on their valuation after meeting taxes, even under the present low rate of speed, instead of the present actual return of 3.9 per cent.

In other words, if the street railways were to earn only a return of say 8 per cent, the service could be supplied at a revenue per passenger-mile considerably below that of the buses, even under present conditions. With the system thoroughly modernized, the advantage of the railway would be still greater. It might even be possible with the heavy traffic density in New York City that a 5-cent fare would suffice.

These considerations would not seem to indicate any inherent weakness in the street railway.

The present low speed of the cars is of course not entirely the fault of the cars and operating methods. Traffic regulation in New York City is not designed to assist street car movement. Parking regulations and their enforcement are lax. It is not unusual to see automobiles standing in double lines along the curb and forcing all moving vehicles onto the car tracks. Left-hand turns are allowed practically everywhere. Vehicles may turn around in the middle of the block, bringing all other traffic to a standstill. Much time is lost on account of the lack of flexibility of the interlocked traffic signal lights used on main thoroughfares. In short, traffic regulation in New York is probably the worst in any large city in the United States, from the street railway standpoint.

Part of the remedy for the railway situation is managerial in nature; the remainder is political. If the two interested parties will come honestly to the common purpose of providing good surface transportation for the citizens of New York City, the situation can be solved. The JOURNAL believes there is a way to work it out if progressiveness and co-operation on both sides can be brought about.

The fact that the existing system of surface transportation is not efficient is no reason to replace it by a system which is inherently unsuited to the conditions. The present situation is largely the fault of the public, which for years has allowed the politicians to hamstring the railways upon every occasion. In the interest of good transportation it would be better to increase the efficiency of the street railway system than to allow public clamor to drive these companies into the operation of buses under conditions for which they are not fitted. Above all, it would be a grave mistake to allow a matter of this kind to be decided by fancy or sentiment instead of by cold, hard facts.

There is plenty of field in New York for the bus—to supplement the railways, but not to displace them.

## Akron Voters Wisely Approve Fare Increase and New Short-Term Franchise

NEWS deeply significant comes out of Akron, Ohio. At the election in that city on Nov. 4 the voters approved an ordinance under which co-ordinated railway and bus service will be continued. The term of the new franchise is only 4 years, which period, it is expected, will furnish a reliable guide to future normal prices and transportation costs. Neither the company nor the city thought it advisable to enter into a long-term contract at this time. Under the terms of the temporary ordinance which has been in effect since last February, when the company's franchise expired, the company would have had no right to operate after May 1, 1925. It would be idle to speculate upon the consequences which might have followed a rejection of the settlement proposal at the polls. Akron had no such thought. The size of the vote in favor of the new grant proves that.

It is only last February that Akron appeared to be determined to exact its pound of flesh from its railway. Since then, however, the thought of its experience without service has had its effect. Long ago Akron could have had all that is in prospect for it now without the turmoil that attended the suspension of railway and bus service there for a period of thirty days, but Akron was misled, badly misled. It knows that now.

The provisions of the new grant under which the joint bus and railway service will be operated for the next four years give great promise for the future. On the basis of the public inquiry which fixed the "bare" cost of carrying a passenger in 1923 at 5.55 cents, the company is assured a living wage, as the new fare will give a minimum revenue per passenger of 5.88 cents, this coming from the frequent riders who take advantage of the lowest rate of 17 tickets for $1. The city is protected with respect to the conditions under which it can exercise the right to purchase the entire property. And the public is assured adequate service by car and bus at a low rate of fare.

The attitude of the city officials and the public press during the period incident to the campaign in behalf of the new settlement proposal was certainly in striking contrast to the sentiment expressed previous to the withdrawal of service last February. Critics of the Akron company there have been and probably always will be. This is the fate of any public enterprise. But there is no satisfactory answer to the argument of the company itself in behalf of the new grant. In effect, that statement was that it must be apparent to everyone that unless the company does supply good service in the next four years, it cannot hope to have the public good will necessary to continue to operate the system beyond the present contract period.

# Supervisory Controlled Substation on Chicago Elevated

**New Substation at Junction with North Shore Line Controlled by Power Supervisor in General Offices in Edison Building—2,000-Kw. Machine Has Full Automatic Features—Building Located in Residential Section, Necessitating Artistic Design**

*By Dwight L. Smith*
Assistant Electrical Engineer Chicago Rapid Transit Company

EXTENSIVE developments in supervisory control led the Chicago Rapid Transit Company to adopt this system in conjunction with its new automatic substation at Central Street, Evanston. This automatic substation is located near Linden Avenue, Wilmette, which is the junction of the Chicago Rapid Transit system with the Chicago, North Shore & Milwaukee Railroad, as well as being the location of a large storage yard. The substation at present includes one 2,000-kw. rotary converter, housed with switchboard and control in a building 25 ft. x 34 ft., and 16 ft. high inside. Oil switches, disconnects, and power and control transformers are located in an adjacent outdoor court. Sufficient ground space is available for the erection of the second building to house an equal additional capacity and for duplicate outdoor equipment. The station is full automatic with all modern protective devices, including two steps of loading limiting resistance for the machine, and has three automatic reclosing feeder panels for the control of two feeder sections for the Chicago Elevated and one for the North Shore Line, as well as a feeder panel for the Evanston Railway.

As the desired location for a station was within the exclusive North Shore residential district, it was located on the property of the Evanston Railway, where the latter already had a carhouse. Even three sides of this location faced directly on properties zoned for residences. On the fourth side, a golf course and a proposed boulevard along the North Shore drainage channel came between the substation and the right-of-way. To make the station fit these surroundings and conditions, the building was constructed of face brick, trimmed with artificial stone, matching the car station building. The outdoor equipment is inclosed on the street side with a neat face brick wall of similar design.

### Transmitting the Purchased Power

The 60-cycle, three-phase, 12,000-volt energy is obtained from the Commonwealth Edison Company at the point where its transmission lines approach the station. It is carried to the station by a No. 00 transmission line built and owned by the Chicago Rapid Transit Company along its right-of-way. Not only was it desirable for the sake of appearance, but since the golf course and boulevard mentioned lay between the station and the railway right-of-way, it was necessary to bring all feeders and the transmission line into the station underground. A 16-duct line was built from a manhole on the right-of-way to a manhole in the street in front of the station. From this latter manhole ducts carry the high-tension cable to the steel structure in the outdoor court, the positive feeders into the switchboard pit and the negative feeders directly into the machine pit.



Central Street Automatic Substation of the Chicago Rapid Transit Company, in Which the Supervisory Equipment Is Installed

The telephone cable, containing the telephone and supervisory control lines, also comes through this duct line.

At the right-of-way, laterals extend from the manhole up a structure built between two poles 10 ft. apart. The cables extend up these laterals to disconnect switches at the top and thence to the various feeders and the transmission line. A grounding switch is mounted in the high-tension line at this point. All switches are locked and are available only from a platform 25 ft. high mounted between the two poles. The negative feeders run directly from the manhole on the right-of-way to the track rails.

The high-tension cable terminates in a pothead mounted on a steel structure in the outdoor court of the substation. This structure serves as a support for the disconnect switches, fused disconnects for the operating transformer and the choke coils. The type KO-36 oil circuit breaker is mounted next to this structure, with the current transformers between the oil circuit breaker and the power transformers. The latter are 700-kva. each, oil insulated and self-cooling. All transformers have 12,000-33,000-volt primary windings, and the transmission line and all high-tension wiring is insulated for the higher voltage. The outdoor apparatus is elevated on steel structures of sufficient height to place all live parts more than 10 ft. above the concrete floor of the court. The entire court is inclosed by a wire fence.

Inside the building the switchboard occupies the end of the building near the court, with the load-limiting resistances on the floor level behind the switchboard.

The contactors, high-speed circuit breakers and field rheostat are mounted on a structure above the switchboard. Slate runways are in front and behind the contactors and breakers. The converter is at the other end of the building near one side, leaving room beside it for the telephone booth, air compressor, steel workbench and steel lockers for tools, spare parts and supplies.

Connections from the low-tension side of the transformers are made by paper-insulated, lead-covered cables, which come into the station through wall bushings, thence down ducts leading directly to the converter pit and the pit in the rear of the starting panel. The d.c. connections from the rotary to the switchboard are made in a similar manner. Vertical legs from the starting panel and the a.c. rings on the machine are made with copper bus to which the cables are attached in the pits. A pit 26 in. wide and 24 in. deep runs the entire length of the switchboard in its rear and serves as a handhole for terminating these cables as well as all control wiring conduits, and as a runway for all control wiring. The pit has a removable slate cover, thus all wiring is neatly concealed but easily accessible.

In addition to the automatic features, a supervisory control system connects the station with the power supervisor's office, 15 miles distant in the main offices of the company located in the Edison Building, Chicago. This system provides means for the supervisor to lock out or release the machine and to open or close any feeder at will. It also gives an automatic indication by red or green lamps on the supervisor's board whether the machine is running or shut down and the feeders open or closed. This indication takes place whether the action has been performed by the supervisor or automatically.

The supervisory control system consists essentially of standard telephone selector equipment with sending and receiving features at both the power supervisor's office and the substations. It operates over three wires, No. 22 gage in the railroad company's telephone cable. For sending the supervisor has manually operated selector keys, one to open and one to close each controlled apparatus. These keys actuate pole-changing relays according to a predetermined code setting, notching up the selector having the same code setting at the substation. The substation selector operates an auxiliary relay through whose contacts the control circuit of the apparatus is looped. The opening of the auxiliary relay opens the control circuit and disconnects the apparatus, while the closing of the auxiliary relay completes the control circuit and permits the apparatus to function automatically.

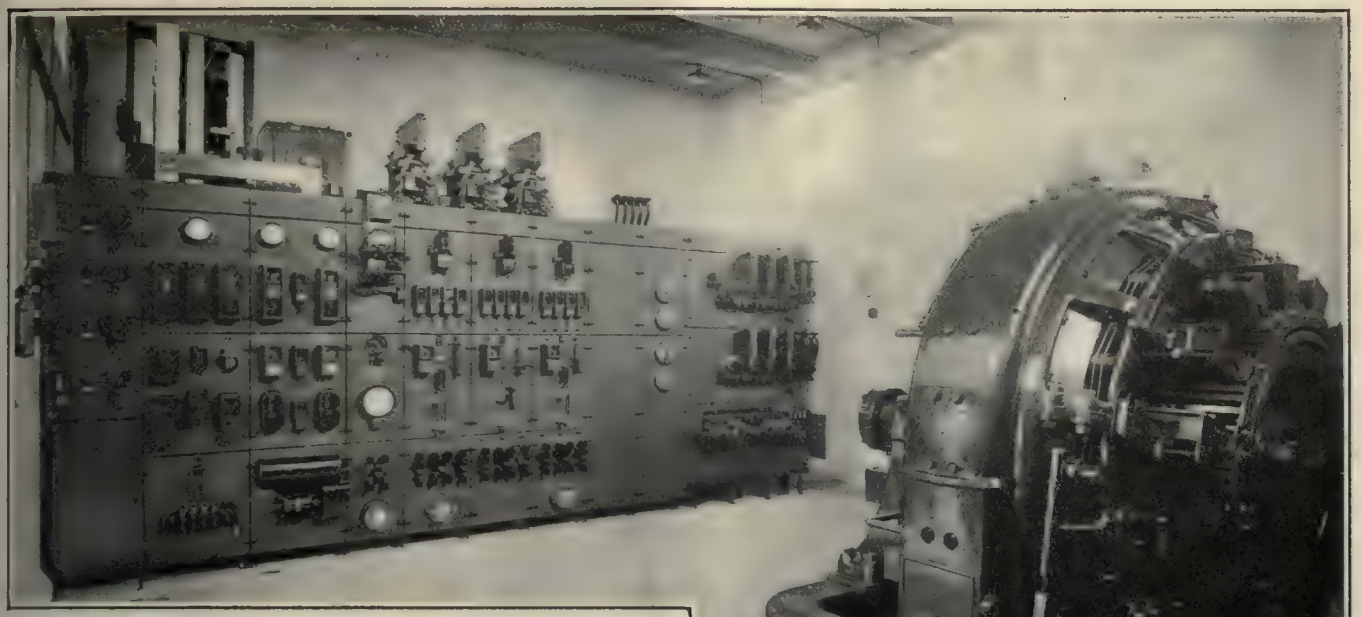
The return indication is initiated by interlocks on the apparatus controlled. A change in the position of the apparatus actuates a motor selector key in the substation, operating a selector in the office and lighting the proper indicator lamp. Only one-half the number of selectors are used in the office as at the substation. As an additional protection insuring proper indication, the polarity sequence of the code for indicating the open position of any one piece of apparatus is reversed for indicating the closed position. The indication itself is finally obtained by the action of a polarized relay which indicates according to the polarity of the last impulse of the code received.

A control shelf at the power supervisor's office holds the pole-changing relay which furnishes the impulses to the selectors at either end, relays for the pilot lamps and buzzer indications to the supervisor of changes in indications and locking relays preventing the mixing up of outgoing and incoming impulses. This apparatus is mounted in a steel cabinet.

At the substation end there are mounted in a similar cabinet the selectors and motor-driven selector keys,



At Left, All High-Tension Apparatus Is Located in an Adjacent Outdoor Court, Inclosed by a Brick Wall and Wire Fence. At Right, Laterals and Switches Connect the Duct Line from the Substation with the Overhead at the Railway Right-of-Way





Above, Full Supervisory Control Apparatus Is Carried on the Left-Hand Panel of the Switchboard. The 2,000-Kw. Converter Is Shown in the Foreground

At Left, Near View of the Supervisory Control Cabinet and Panel Shown Above. Auxiliary Relays Operating Control Circuits Are on the Wall at Left of Panel and Indicating Relays at Right of Panel. In the Cabinet the Selectors Are on the Top Shelf, While the Motor-Driven Selector Key Is Beneath

together with a locking relay which will prevent interference with indication signals from other substations when they are installed. On a switchboard panel are mounted the auxiliary relays operating the control circuits, and those actuated by apparatus interlocks initiating the proper indication code on the motor keys.

Energy for the operation of the system is supplied by small storage batteries, the office end having a 144-volt battery for the polarized impulses and a 24-volt battery for the operation of the relays. Pilot and indication lamps are supplied from a separate source. Substation batteries consist of three 24-volt units which are used separately for the operating relays and motor keys and in series with each other and the 24-volt battery at the office end for the operation of the pole-changing relay for return indications. Batteries are trickle charged from 600-volt railway or 110-volt commercial sources with relays to disconnect them during operation.

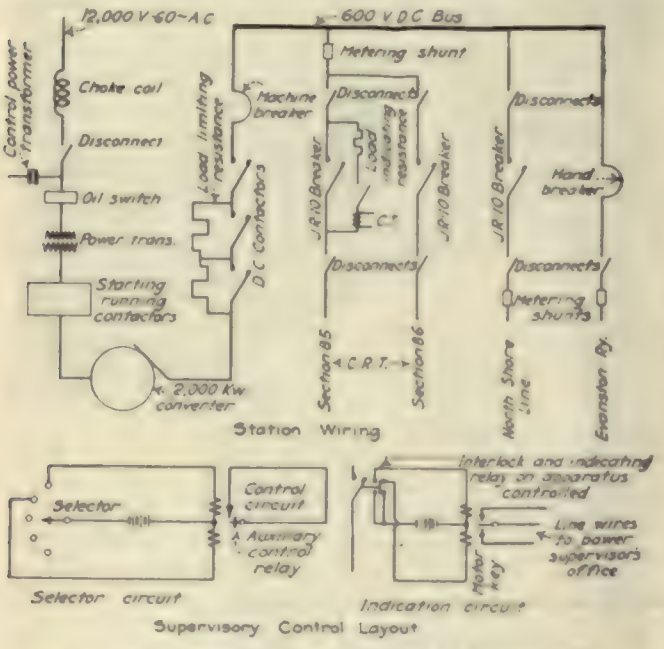
The return indication features provide for storing of signals so that simultaneous operations of apparatus in the substation are sent to the power supervisor in a definite order without interference. Similarly incoming signals to him lock out his sending apparatus and interference between incoming and outgoing impulses is prevented. All circuits are normally open and a break or short circuit in line wires cannot produce any false operation or indication. These line wires are looped through jacks both at the power supervisor and substation ends. A test circuit with plugs for these jacks permits the supervisor and the substation maintainer to make a daily test for freedom from grounds and continuity of each of the three line wires.

### Supervising Equipment Saves Delays

The supervisory control system has been found of great assistance in handling power, for not only can the operations be performed almost instantly, but the return indications are received just as quickly. Instead of having the delay incident to calling operators on

the ordinary telephone system and waiting for their report back, the switching and indication is accomplished instantaneously. Although not done in this case, as ample telephone cable facilities are available, it is possible to utilize the control wires for the operation of telephones as well.

The automatic reclosing feeder equipment consists of a high-speed circuit breaker with control circuits and relays which provide protection for both the machine and the feeder section itself. The high-speed breaker with "trip free" feature has been entirely successful in protecting the rotary converter from flashovers. Tests made by short-circuiting a feeder just outside the substation have opened the circuit breaker without so much as producing a "squeal" on the converter. The control circuit relays provide for taking




**General Schematic Wiring Diagram of Station and Supervisory Control**

the control current from either the bus or the feeder, whichever has the higher voltage. The breaker will remain closed as long as the potential on either side is 250 volts or above, thus providing for feeding either out from the substation, or when the station is shut down for feeding through the station bus.

Thermal relays in the feeder busbar provide for opening the breaker when the bus becomes overheated, reclosing again when the temperature decreases. This feature, however, is unnecessary as the installation is designed to carry maximum useful loads while the high-speed breaker will care for short-circuit conditions. This breaker has a reclosing coil and a holding coil which holds the breaker closed. A bucking bar paralleled by an inductive shunt, in series with the load, produces a field opposed to that of the holding coils. When the field produced by the bucking bar becomes greater than that of the holding coil, the breaker is opened by a spring. The field of the bucking bar varies with the rate of increase of the load, a slow increase permitting a greater portion of the current to go through the inductive shunt than a rapid increase. Thus the breaker will open on a lower current produced by a short circuit with its rapid current rise than where the current is taken for ordinary uses with a comparatively slower rate of increase.

When the breaker is opened automatically a time delay relay starts. It completes its action in 15 seconds, closing a small feeling-out contactor which completes the feeder circuit through a load indicating resistance, in series with which is a current transformer. If the short circuit still exists the rush of heavy current through this transformer trips a relay which opens the small contactor and starts the whole cycle over again. At the same time the small contactor closes, an auxiliary time delay closing relay starts to close, its action taking long enough so that if the tripping relay operates it will be restored and again start its action at the proper place in the cycle. This action will be repeated until the short-circuit condition is removed and the current through the small contactor, resistance and current transformer is small enough to prevent a kick which will open the tripping relay. If the tripping relay does not operate, the auxiliary closing relay completes its action and closes the high-speed breaker. Variation of the current setting at which the breaker will trip is obtained by varying the reluctance of the magnetic circuit of the holding coil.

The apparatus is provided with disconnects on each side of the circuit breaker and thus can be isolated for inspection or maintenance. Although the main contacts of the circuit breaker are comparatively small for the current rating, no trouble has been experienced with them. The breaker is opened manually by a knife switch in the control circuit. The supervisory control operating relay contacts are in series with this same circuit.

All this apparatus and the station equipment were furnished by the General Electric Company.

Ventilation inside the station is natural through louvers placed low on the walls and four 3-ft. diameter ventilators in the roof. Two ducts lead from outside the station directly into the converter pit. On warm days the temperature inside the station rises well over 100 deg. F., but it was not felt that sufficient decrease in this temperature could be obtained by forced ventilation to warrant its use, and several protective relays have been redesigned to withstand these temperatures. The station is well lighted both inside and out, with an emergency throw-over switch so that the lights can be thrown onto any of the feeders entering the station.

The number of customers supplied from this one station has necessitated a complicated metering arrangement, but hourly reading printometers record accurate information not only of the daily output but of the hourly output, which is necessary for determining the maximum demand.

The station normally runs from 6 a.m. to 1 a.m. and during this time the load is such that it never shuts down from lack of load. During the other five hours of the day it is locked out by the power supervisor.

On the daily inspection, which takes one to two hours, printometer tapes are changed, meters and apparatus counters read, supervisory control lines are tested and a casual inspection is given to the apparatus. Once a week the maintainer makes a night inspection, which gives 5 hours during which the station is shut down for careful inspection and any work not possible while it is running. A daily report is made to the office, and by means of apparatus counter readings, voltmeter charts and meter readings a very accurate account is available of the operation of the station.

# Automatic Rear Exit Doors on Toronto Rebuilt Cars

**Sixty Former Two-Man Cars Are Being Arranged for One-Man Operation by Installation of Automatic Doors at Rear—Passengers Will Enter at Front End Only, but May Leave at Either End**

AS PART of a general program of remodeling 351 cars taken over from the Toronto Railway in 1921, the Toronto Transportation Commission is now converting 60 of these cars for one-man operation, utilizing a front entrance and exit in combination with a rear exit controlled by an automatic exit door. In the arrangement of the car and the door control a number of interesting features are included, some original with the Toronto installation and others adapted from designs in use elsewhere.

The automatic rear exit feature is patterned after the design which has been found successful on a sample car operated by the Washington Railway & Electric Company and which was described in the ELECTRIC RAILWAY JOURNAL of Aug. 30. In the case of the Washington car, however, the treadle arrangement is installed on each platform of a double-end car, so as to be used as a rear exit regardless of the direction of motion, while the new Toronto cars will be single end, and only one treadle per car will be necessary.

Originally equipped with longitudinal seats, these cars are only 8 ft. ½ in. wide over the side posts. They are now being equipped with cross-seats on one side, giving an aisle width of 2 ft. 8¾ in., so as to encourage passengers to move toward the rear end instead of blocking the space at the front end of the body near the entrance door. The seating arrangement adopted, together with circular seats at the rear end, gives a total seating capacity of 51.

At the front end, a passageway for both entrance and exit is provided. The entrance door is pneumatically controlled from the brake valve, while the exit door at this end is manually operated by means of an auxiliary control provided for the purpose. The arrangement is such, however, that when the entrance door has been opened, it will in closing also close the front exit door if the latter is open at the time.

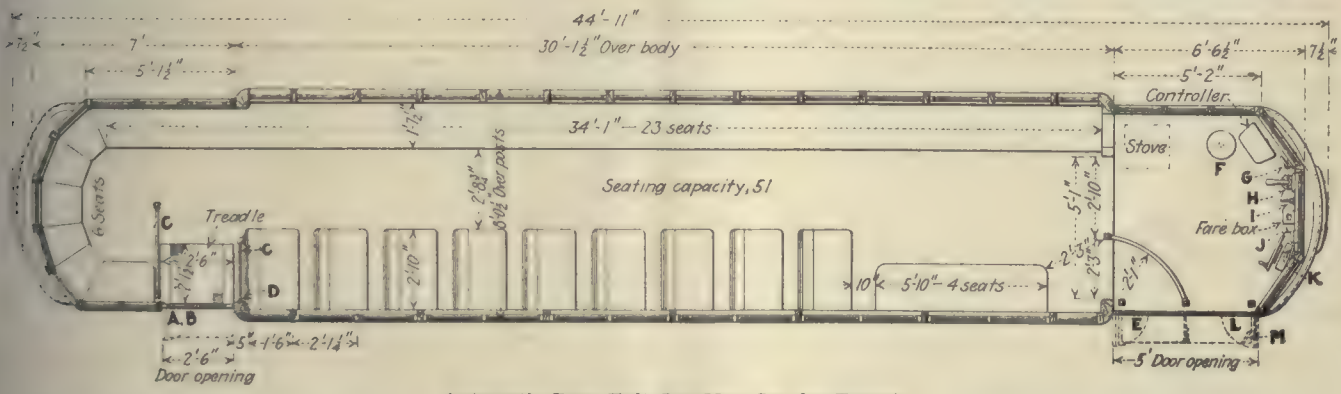
Control of the door engines is obtained from the brake valve. Two door-opening notches on the segment of this valve give a selective control between the front door and the rear treadle-operated exit. In other words, when the valve handle is set to the first door-opening notch, the rear exit door will open provided there is a passenger on the treadle, or this will occur whenever a passenger steps on the treadle while the valve remains in the same position. If the handle is moved to the second door-opening notch, the action of the rear door will be exactly the same, but in addition the front door will be opened. Under both settings of the handle, the rear door closes automatically as soon as the alighting passenger has cleared the step. Thus the rear door is automatically closed to prevent passengers entering at that point, and this also prevents the door from remaining open in cold or inclement weather any longer than is necessary to allow passengers to leave the car.

### DOOR ACTION SUPERVISED BY MOTORMAN

When the brake valve handle is returned to the release position the rear exit door does not close until alighting passengers have entirely cleared the exit step. When the step is clear the door then automatically closes. An additional safety feature is provided in the form of a small auxiliary control valve adjacent to the brake valve, which enables the operator either to lock the rear door against the action of the treadle when the front door is opened, or to open the rear door directly, if this becomes necessary for any reason when no passenger is on the treadle.

Mirrors are arranged at the front end of the car to enable the operator to see both the interior of the car back of him and the rear exit step, without turning around. Extra lights installed over the rear door are lit only when the door is open. At the front end a standard door interlock signal lamp is installed, and in addition an auxiliary red lamp is lit when the rear door is open.

Both the pneumatic door equipment and the automatic treadle device are being furnished by the National Pneumatic Company. The rear platform of the car is flush with the body floor, but the rear exit treadle is set down 9½ in. so that an alighting passenger steps down to the treadle and then to the exit step.




**Automatic Rear Exit One-Man Car for Toronto**

Passengers board at the front end, and leave either at that end or at the rear through an automatic rear exit door. Selective door control is obtained from the brake valve, and mirrors and signal lights are arranged so as to give the operator a view of the rear step.

A—Rear exit door is controlled by treadle. It is operative only when the air-brake valve is in "door open" position.

B—Extra lights installed over rear door are operated by the treadle, lighting when the door is open and being extinguished when the door is closed.

C—Rear exit grab rail.

D—Push button for use of passengers standing on or near treadle.

E—Front exit doors are operated both ways manually, but will close pneumatically with entrance doors when the latter have been open.

F—Motorman's removable seat in socket.

G—Manual handle for operating front exit door.

H—Brake and pneumatic door control.

I—Valve to open or lock rear exit door independent of treadle.

J—Signal lamps. Upper, standard door interlock signal lamps. Lower, red lamp, lighting when read door is open, and extinguishing when door is closed.

K—Mirror for observation of interior movement.

L—Front pair of doors fully pneumatically operated from brake valve.

M—Mirror for observing rear step.

# Changing Knockers Into Boosters

**Skillfully Conducted Publicity Campaign of Georgia Railway & Power Company Has Been an Important Factor in Influencing Public Opinion**

THAT it pays to advertise public utilities as well as other lines of business has been effectively demonstrated during the past year or two by the Georgia Railway & Power Company, Atlanta, Ga. Only a few years ago the company was spending comparatively little money in newspaper advertising, but an indication of its changed policy is seen in the fact that its new business advertising for this year will amount to more than $50,000.

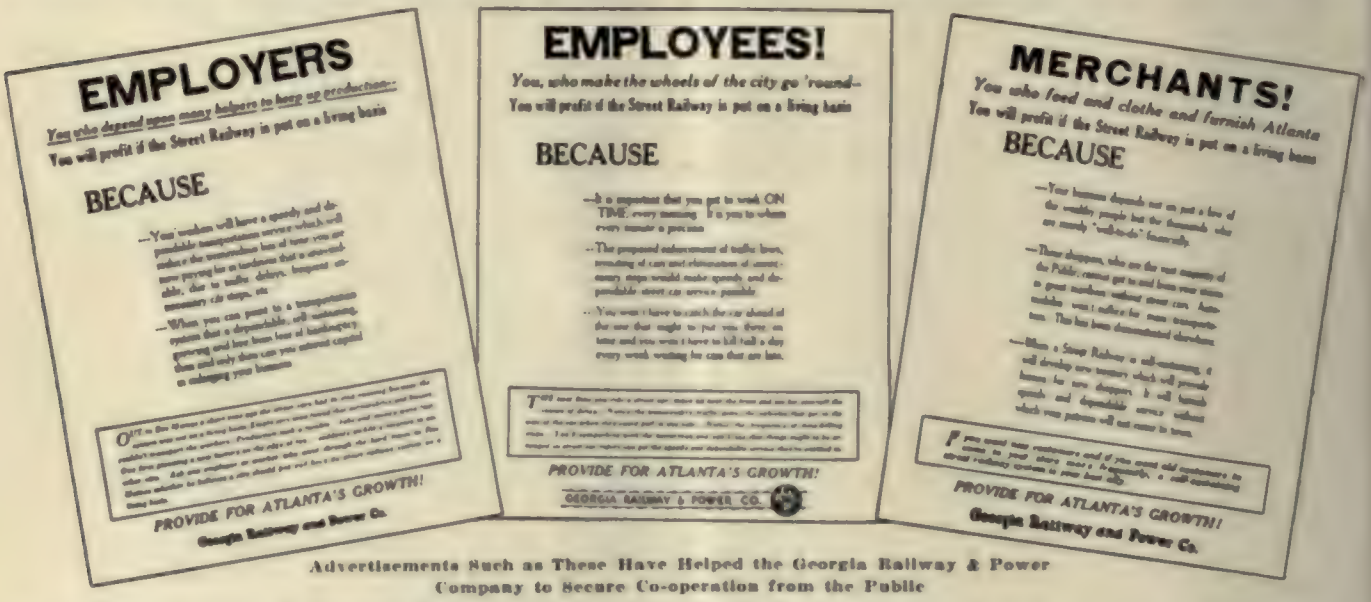
This company is one of three in the South to conduct a public relations department. The department uses various means for accomplishing its end—advertising, speakers, car cards, billboards, and a street-car publication distributed from "take one" boxes. The work of the department has proved profitable beyond all expectation in building up good will in the territory served.

Soon after it was decided to organize a public relations department, an extensive publicity campaign was launched. One of the first steps was the issuance of a little four-page pamphlet called "Two Bells," published weekly and distributed on the street cars. Considerable advertising space in the daily newspapers was used and the message was further "got over" to the public by the use of dash signs and inside car cards. Another publication is a window card changed weekly, known as "The Empire State," and setting forth the things for which Georgia, the so-called "Empire State of the South," is most famous. The matter used is wholly of an educational nature, unmixed with propaganda of any sort, and the card quickly became popular over the whole state. Its slogan, "It's Great to Be a Georgian," has been taken up by other organizations in the company's territory. As for "Two Bells," it is a breezy little paper, 5½ in. x 8½ in., set two columns to the page. Each issue contains quips and messages ingeniously and palatably mixed. The running heads are used to remind readers to "Use Street Car Tickets and Help Speed Traffic," to "Obey Traffic Laws" and to convey similar admonitions.

The department also issues a monthly company publication, "Snap Shots," which stands in the front rank of utility publications throughout the country. Still another publication, "The Ally of the Home," containing information about the appliances sold by the company useful to housewives, is published monthly and sent out with the monthly bills. All the publications are printed in the company's own plant, as are most of the forms and other printed matter used by the company. This plant is operated under the direction of the public relations department and effects a large saving yearly over the old method of sending out all printing jobs.

### Romance of Power Depicted

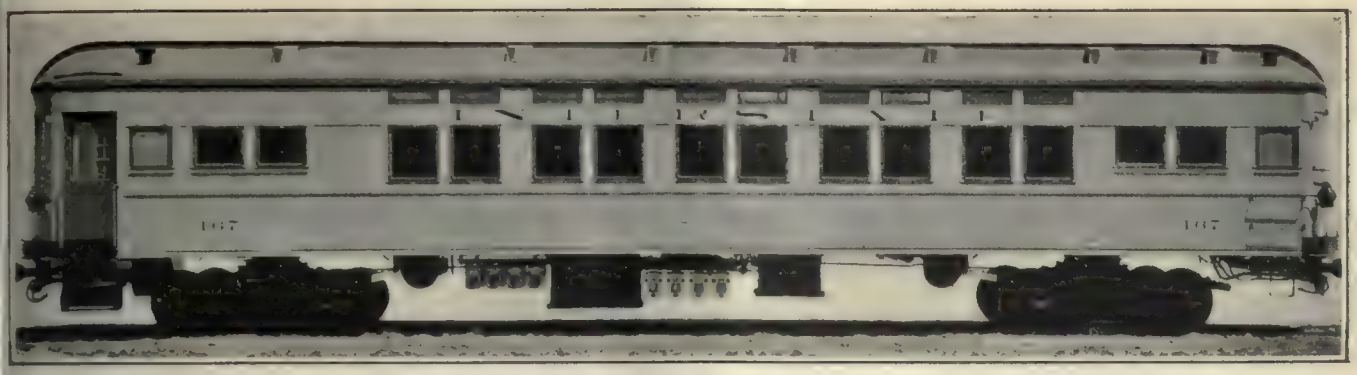
A series of posters of an educational nature on the subject "What Is Power?" was prepared some time ago and placed in conspicuous places in all of the city cars and interurban cars operated by the company. The information in the posters is the result of original research work done by engineers of the company. It depicts the romance of power and traces the development from the days of prehistoric man to the present time. The posters were all copyrighted by the company. The complete story was told through a series of twelve brief lectures, running one each week.




**Advertisements Such as These Have Helped the Georgia Railway & Power Company to Secure Co-operation from the Public**

Under the direction of the public relations department the company also ties in with community affairs by using its dash sign space for good-will advertising of local events, church and other charitable affairs. It has organized a quartet, whose services are free for such affairs. This has proved a valuable instrument in building up good will for the company.

Through the work of the public relations department, the car riding public and also the patrons of the other departments of the company have come to have a better idea of the problems and perplexities of operating a public utility. They have learned that the company really has little voice in the matter of the rates charged for street car rides, for gas and electric service. They have learned that the company is in the business of selling service and that in addition to that the company is willing and anxious to be identified with the community life of the city.



One of Three 62-Ft., 10-Section Sleeping Cars Recently Placed in Service Between Louisville and Indianapolis

# Sleeping Car Service Begun by Interstate Public Service Company

**Extra Long Berths, with Windows Alongside Uppers; Large Washrooms and Easy Riding Qualities Are Features of Three Sleeping Cars Recently Placed in Service Between Indianapolis and Louisville—They Are Operated on a Slow Schedule with a Layover Before Entering Terminal—This New Equipment Cost $100,000**

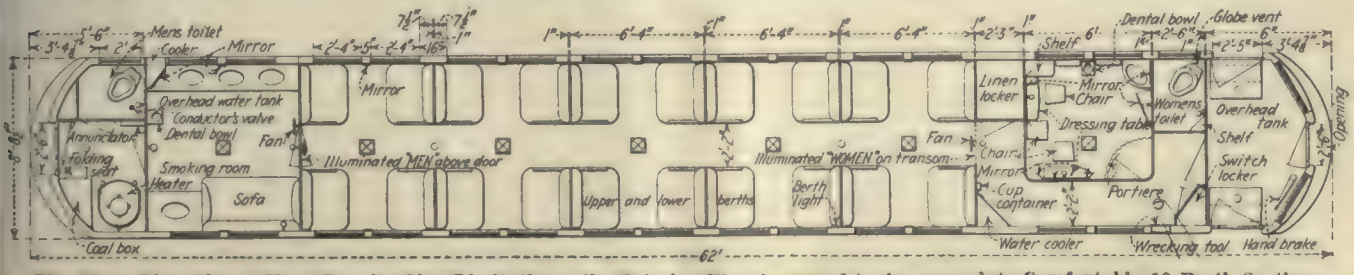
ELECTRIC railway transportation between Indianapolis and Louisville was advanced another step when the Interstate Public Service Company began the operation of sleeping cars. To furnish this service, three all-steel 10-section sleepers were designed by the company. These cars embody the latest ideas to be found in steam railroad equipment of the same type. In addition they have several new features. In spite of limitations as to length, truck size, width and overhang the cars have been arranged so that the available space is utilized to such advantage that greater convenience and comfort is afforded than is found in a standard Pullman sleeper. These cars are not motorized. They were built by the American Car & Foundry Company. The three cost approximately $100,000.

The car is 62 ft. long and 8 ft. 8½ in. wide, with a total weight of 50 tons. It is mounted on Baldwin interurban-type, four-wheel trailer trucks with special elliptic and coil springs to secure riding comfort. Rolled-steel wheels of 34-in. diameter and having 3½-in. A.E.R.E.A. tread are used. The Tomlinson M.C.B. automatic radial couplers at either end have G.E. 10-wire coupler plugs which carry the train control line, a 600-volt lighting circuit and a signal system. Air connections at both ends of the car provide for brakes and a service supply.

As most of the lamps within the car require a 32-volt current, an Edison 24-cell, 300-amp.-hr. battery of that voltage is carried under the car. To charge this battery a motor-generator set has been installed instead of the resistor grids originally provided. This machine operates from the 600-volt trolley circuit, being supplied with power through the car-to-car jumper or by means of a pole hooked on the trolley wire when the car is standing at a terminal. The set is cut in and out by means of a relay actuated by a reversible watt-hour meter mounted on the switch panel. Two electric heaters located under the car and controlled by a thermostat supply hot water to the washrooms. These heaters have 5-gal. copper tanks surrounded by heating coils and asbestos packing. The coils receive energy from the 600-volt circuit.

The car has steps on both sides but only at the front end. It is to this end that the motor car is coupled. Although an end vestibule door has been provided at the rear, it is necessary to pass through the men's dressing room in order to leave the car at that end. Standard Interstate orange enamel, set off with red sash, doors and roof, gives the car an attractive appearance. The company name and the name and number of the car are lettered on the sides. The three cars have been named "Scottsburg," "Indianapolis" and "Louisville."

Passenger comfort and safety were the two outstanding considerations in the design. A heavy, sound-insulated trail car, without air compressor, motors, or trolley pole, was the result. The sub-frame is built up




The Floor Plan Shows How, Despite Size Limitations, the Interior Was Arranged to Accommodate Comfortably 10 Berth Sections

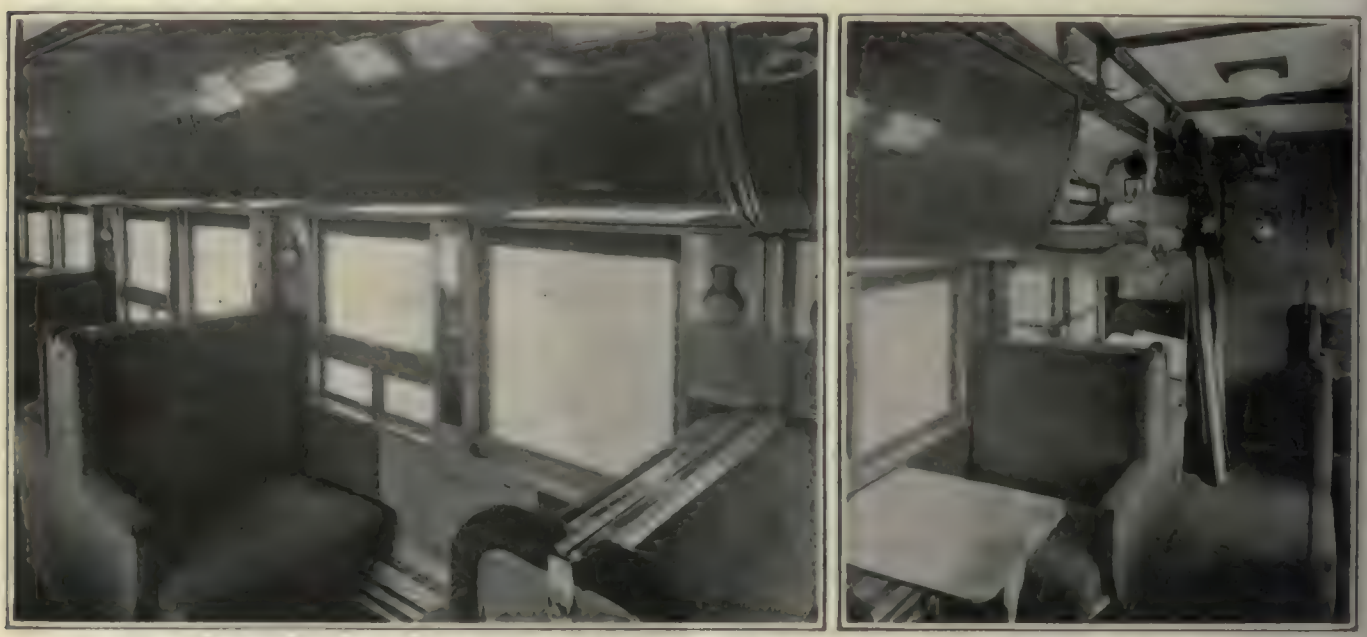
of two 7-in., 16.4-lb. channel center sills and 5-in. x 3½-in. x ⅜-in. side sills tied together with 7-in., 9.8-lb. channels with 8-in. x ½-in. top and bottom plates, and 4-in., 5.4-lb. channel floor beams. The bolsters are built up of structural steel sections having ⅜-in. double web with a 26-in. x ⅝-in. top cover plate and a 12-in. x ⅝-in. bottom cover plate. The end sills are 7-in., 9.8-lb. channel sections with 12-in. x ½-in. top cover plate. A 10-in., 15.3-lb. channel placed with flanges outward serves as a buffer beam at each end of the car. A 5½-in. Rico anti-climber 4 ft. long has been placed inside the channel at its center. This buffer is attached to the ends of the 7-in., 15.4-lb. channel platform arms, which extend to the bolster. The entire sub-frame is strengthened by 4-in., 8.2-lb. diagonal braces of Z section which extend between the bolsters and end sills, and between the bolsters and the adjacent floor beams.

Mounted on this sub-frame is a steel-framed body. The wider side posts are 2½-in. x 2-in. x ¼-in. angles, while the narrow ones are single 3-in., 4.1-lb. channels. The letterboard is between the single sash windows and the small upper berth windows. The carlines are 2-in. x ½-in. x ⅜-in. angles bent to form the monitor roof, and are continuous from side plate to side plate. A tongued and grooved ½-in. poplar roof is laid on yellow pine furring attached to the carlines. Over this is a layer of felt paper and a layer of canvas. The side sheathing is No. 11 steel, reinforced and attached to the side posts, side sill, belt rail and side plate.

### Many Conveniences Are Provided

Every effort was made to have the interior of the car commodious and luxurious in appearance. The ladies' dressing room at the front end of the car, with a passageway to one side, is somewhat larger than that found on Pullman cars. A three-section mirror is located on each of the two side walls. Below each mirror is a dressing shelf and a hair receiver. Three low-back, upholstered chairs have been provided. A corner washbowl is directly under one of the windows and a dental lavatory is between the two side windows. The finish of the woodwork and walls below the belt rail is light mahogany. Above the belt rail the side walls are finished in buff enamel decorated with gold. A dome light and three wall fixtures provide illumination over the mirrors. Two towel racks have been mounted over the side windows. The interior finish of the toilet room is white enameled Lincrusto wallboard with an embossed tile design.

The men's room occupies the entire width of the car at the rear end. It has a three-bowl washbench along one side and a single bowl and small upholstered seat on the other side. Water for use in the dressing rooms and toilets is supplied from a 100-gal. tank located over the vestibules and dressing rooms at each end of the car. The bowls were furnished by the Adams & West-



At Left—Each Berth Section Is 6 Ft. 4 In. Long and 3 Ft. Wide and Is Arranged in a Manner Similar to that of a Pullman.
At Right—Ventilating Windows for the Upper Berth Are Provided and Two-Section Curtains.
In the Foreground Is a Folding Table for Use During the Daytime

lake Company and are arranged with tilting lever faucets and drain. The interior finish of the men's room is of light mahogany throughout with the exception of the ceiling, which is finished in white enamel to correspond with the rest of the car. Artificial illumination is afforded by a dome light and five wall fixture lamps.

On one side of the rear vestibule is the men's toilet. The other side holds the coal box and Peter Smith hot water heater. Three rows of heater pipes extend the entire length of the car on either side.

### Berths Are Extra Long

The car has 10 berth sections. Seating accommodations are sufficient for 40 people. Each section is 6 ft. 4 in. long and has a width of 3 ft. These provide a berth longer by approximately 3 in. than that in standard sleeping cars. The cushions and backs of the seats have spring-edge wood frames and are upholstered in green figured plush. The arrangements for making the berths are similar to those in Pullman sleepers of the latest type. Mexican mahogany with hand-rubbed finish is used for all interior trim. Fixtures are finished in dull statuary bronze.

Two windows 8 in. high and 23½ in. wide, arranged

so as to swing in at the top, are placed in the side wall of each upper berth. Permanent copper wire screens are fastened on the outside and the sash may be regulated to any desired position. In addition to the ventilation afforded the lower berth by means of a sliding type ventilator in the lower edge of the storm sash, an independent ventilator is located in the inside lining directly below the narrow side post. This has a slide cover in the inside wall, while its lower end opens under the car. Fifteen American Car & Foundry Company's exhaust-type ventilators are located in the monitor and have 6-in. x 12-in. registers. A 6-in. Globe ventilator is placed in each toilet room.

Floor lamps are installed under four of the seats, to illuminate the aisle when the deck lights are off and the berth curtains are closed. Each upper and lower berth has two shaded lamps. Berth lamps, floor lamps, dome lights in the main compartment, washrooms and toilet, and the fixtures in the dressing room are operated from the 32-volt storage battery. A single five-light, 600-volt circuit for emergency purposes consists of two unshaded lamps in the main compartment, one in the smoking room, one in the vestibule and one in the ladies' dressing room. Push buttons are connected to a 26-position annunciator located on the wall in the rear vestibule.



The Men's Smoking Room at the Rear End Takes Up the Complete Width of the Car. Washbowls, Mirrors, Drinking Water and Seat Are Provided



The Ladies' Dressing Room Contains the Latest Appointments, Including Two Sets of Three-Section Swinging Mirrors, Three Chairs, Washbowl and Dental Lavatory

### Precautions to Deaden Noise

Insulation against road noises has been accomplished by means of heavy flooring. A ⅞-in. yellow pine false flooring is cleated to the stringers; it is separated by a 1-in. layer of hair felt from the double tongued and grooved yellow pine flooring, the lower course of which is ⅞ in. thick while the upper course is ⅝ in. A layer of building paper separates the two courses. Over the vestibule floor, trapdoors, passageway and smoking room floors is a layer of 1-in. red and green checkered inlaid linoleum. The ladies' dressing room, ladies' toilet and main section of the car are covered with a green figured Wilton carpet, with one layer of felt underneath. The floor in the men's toilet is of Flexolith, reinforced with galvanized-iron wire screening. The side and end walls are insulated with two-ply salamander composition fastened to the outside sheathing.

A Federal portable vacuum cleaner has been provided. Two electric outlets for attaching this are available, one in the men's washroom and the other in the passageway at the forward end of the car. Folding tables are also a part of the equipment.

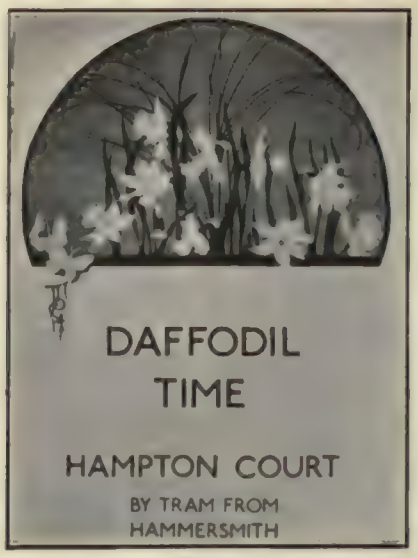
### Sleeping Car Schedule Is Slow

As it is only 110 miles between Louisville and Indianapolis and the running time for a high-speed train is only 3 hours and 45 minutes, it was considered necessary to arrange a new schedule for the sleeping cars in order to bring them into the terminals at a reasonable hour in the morning. A car is ready for occupancy in either terminal at 9 p.m. At 11:30 it is coupled to the last regular train out of the terminal, and by operating on what is known as a "slow drag" the car has a quiet trip going south from Indianapolis to Scottsburg, which requires approximately 3½ hours and is approximately 50 minutes run from Louisville. Here the sleeping car is detached from the train and placed on a siding. At 6:10 in the morning it is picked up by the first train into Louisville, arriving at the terminal at 7:05. A similar layover is provided in the other direction. Passengers are permitted to occupy the car until 9 a.m. The price of a lower is $2.75 and the upper is $2.

The public had opportunity to inspect the cars while they were in the terminals prior to the inauguration of the sleeper service. In order to give the operating staff an opportunity to perfect the service, the company waited until after the sleepers had been running for two weeks before doing extensive advertising.

## Acts as Entertainment News Editor

CLINTON D. SMITH, general manager of the Beaver Valley Traction Company, New Brighton, Pa., has found a new way of stimulating riding on the railway lines to reach entertainments, lectures and the like. This is the editing of a "What's Going On" department in the Beaver *Daily Times*, which lists the amusements, sports, and other public events. These items are gathered by the commercial department of the railway and published without charge by the newspaper.



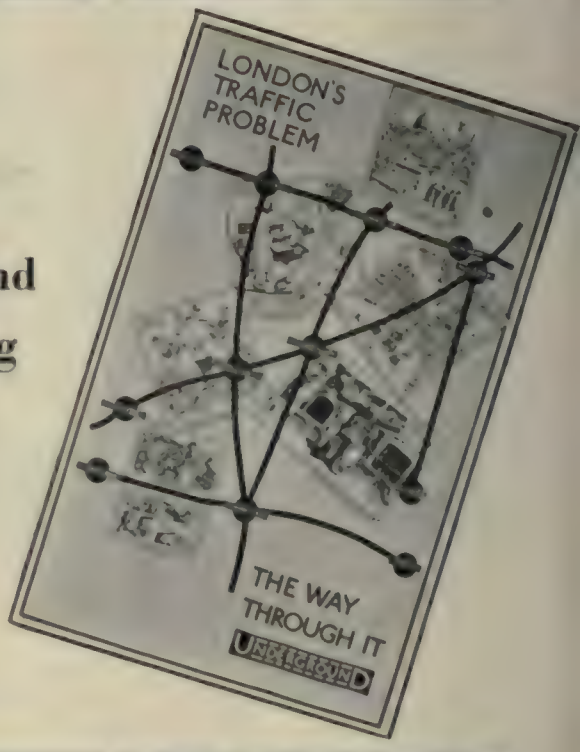






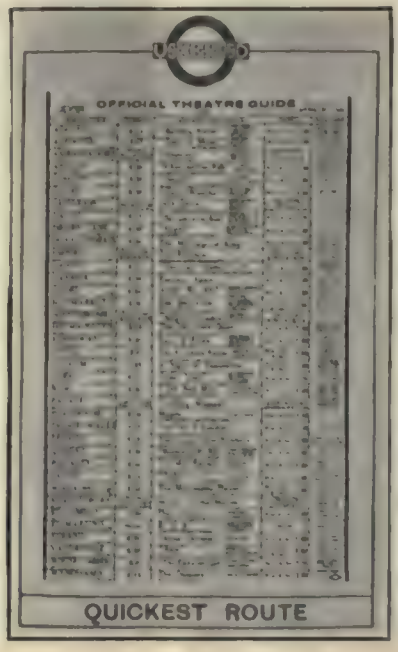



**Recent London Underground Advertising Posters**





















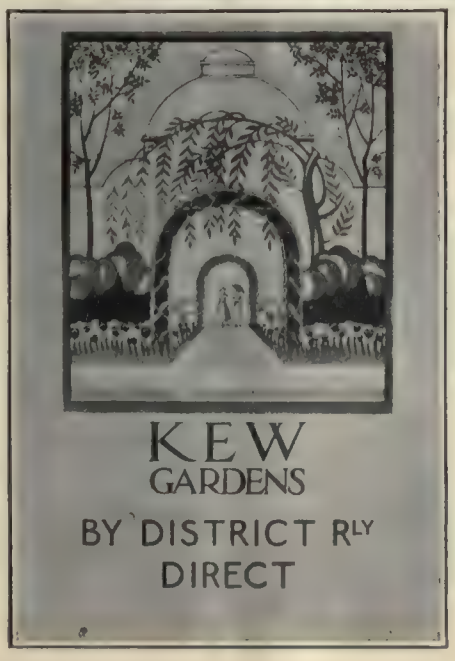
WHATEVER the message—advertising for traffic or to build public understanding and good will—the "Underground" of London seems to have a way of presenting it that tells much at a glance or has an especial appeal from sheer beauty. The reproductions here lose much of their effectiveness because they do not show the colors, but they give a good idea of the subject matter at least.

Aside from those whose attractiveness helps to "put over" the suggestion for seasonal riding, note the extent of the story that is told. The poster to the right gives a remarkable bird's-eye view of the location of all underground stations. The poster itself measures 50 x 39 in. Another shows the increased distance that can be covered in 15 minutes on the Underground as compared to walking or riding the bus or the taxicab. Another tells a construction story without a word and still another shows the way to overcome delays due to traffic.

We Americans, though greatly superior in the character of our general magazine advertising, nevertheless lag far behind these London railway men in our transportation advertising.








## Analysis of New York Surface Transportation

THE accompanying two tables give in brief form the main factors with which to compare the operation of the street railways in New York City with that of the Fifth Avenue Coach Company and the municipal buses. They were prepared by John A. Beeler, consulting engineer, New York, and it may be said that the information is from reliable sources.

SURFACE TRANSPORTATION—MANHATTAN AND BRONX—YEAR ENDED JUNE 30, 1923. ANNUAL OPERATIONS

| | Fifth Avenue Coach Company | Municipal Bus Estimated | Surface Railways |
|---|---|---|---|
| Operating revenue (a) | $5,710,557 | $3,500,000 | $28,626,829 |
| Operating deductions (b) | $3,978,823 | $3,018,000 | $23,008,040 |
| Taxes | 586,223 | 376,000(c) | 2,129,689 |
| Total operating deductions | $4,565,046 | $3,394,000 | $25,137,729 |
| Net earnings | $1,145,511 | $106,000 | $3,489,100 |

(a) Includes passenger revenue and other revenue from operations.
(b) Includes operating expenses and reserve for renewals and retirements.
(c) Estimate based on cost to Coach Company on a ton-mile basis in order to make a true comparison of operations.

The commodity which all three systems are selling is transportation and the method that delivers the most car-miles per car-hour has an advantage over the others. At present the street car is last, making but 7.16 miles, while the coach leads with 8.17.

Traffic on Fifth Avenue is given every advantage over the crosstown traffic under the present tower system. Another condition favoring the Fifth Avenue Coach Company is that its routes are in large part over thoroughfares free from intersecting streets, such as along Central Park and out Riverside Drive.

The municipal buses operate under much less favorable circumstances and are doing fairly well, making 7.5 m.p.h. Their operations are practically confined to short-haul crosstown routes in populous districts.

In order to make a true comparison of the operations, Mr. Beeler added taxes to the operating deductions of the municipal bus. As operated, however, this is not done and the buses actually enjoy an earning power of 13.5 per cent. The Fifth Avenue Coach Company earned 31.5 per cent. The street car, after all operating deductions including taxes, earned 3.9 per cent. With the street cars relieved of taxes, as are the municipal buses, they would show a net earning of 6.4 per cent, even under present low speeds.

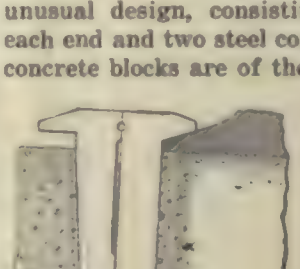
Looking at the situation from another angle, the municipal bus with its short-haul riders and the Fifth Avenue Coach Company with its 10-cent fare average about 5.5 cents per mile per passenger, while the railway averages 3.5 cents.

SURFACE TRANSPORTATION—MANHATTAN AND BRONX—YEAR ENDED JUNE 30, 1923. COMPARATIVE OPERATING STATISTICS

| | Fifth Avenue Coach Company | Municipal Bus Estimated | Surface Railways |
|---|---|---|---|
| Passengers carried (revenue) | 55,974,100 | 70,000,000 | 502,350,281 |
| Passengers carried (transfer) | 3,450,608 | | 77,069,244 |
| Passengers carried (total) | 59,424,718 | 70,000,000 | 579,419,525 |
| Per cent total surface passengers carried | 8 4 | 9 9 | 81 7 |
| Maximum vehicles in daily service | 293 | 206 | 1,599 |
| Average seats per vehicle | 48 | 38 | 44 |
| Revenue-miles | 10,019,805 | 9,022,500 | 43,909,814 |
| Revenue-hours | 1,224,493 | 1,203,000 | 6,125,732 |
| Miles per hour | 8 17 | 7 50 | 7 16 |
| Passengers per revenue-mile | 5 92 | 7 76 | 13 20 |
| Seat-miles per passenger | 8 10 | 2 58 | 3 32 |
| Average length revenue ride, miles | 1 85 | .90 | 1 41 |
| Average per cent seats occupied | 23 | 35 | 42 |
| Cash rate of fare, cents | 10 | 5 | 5 |
| Receipts per passenger, cents | 9.62 | 5 00 | 4 95 |
| Amount per mile, cents | 5.41 | 5.55 | 3.54 |
| Operating revenue per hour | $4.67 | $2 91 | $4.68 |
| Total operating deductions including taxes per hour | 3.73 | 2 82 | 4.10 |
| Net earnings per hour | .94 | 09 | .58 |
| Operating revenue per mile, cents | 57 0 | 38 7 | 65.4 |
| Total operating deductions including taxes per mile, cents | 45 6 | 37.6 | 57.3 |
| Net earnings per mile, cents | 11.4 | 1.1 | 8 1 |
| Per cent operating expenses to total operating revenue | 69 7 | 86 2 | 80 6 |
| Per cent taxes to revenue | 10 3 | 10 7 | 7.4 |
| Per cent net earnings to revenue | 20 0 | 3 1 | 12 0 |
| Investment | $3,612,000 | $2,500,000 | $88,714,429 |
| Investment per dollar of total operating revenue | $0 63 | $0 72 | $3 10 |
| Investment per passenger carried, cents | 6 1 | 3 6 | 15.3 |
| Per cent return on investment | 31 5 | 4 2 | 3 9 |

## Concrete Ties Tried in Bangor

A TRIAL installation of reinforced concrete ties was recently made by the Bangor Railway & Electric Company, Bangor, Me. These ties are of unusual design, consisting of a rectangular block at each end and two steel connecting rods. The rectangular concrete blocks are of the same general cross-section as the ordinary wood tie, with beveled edges. The steel rods run throughout the length of the tie. Spike holes are made in the concrete when it is cast.



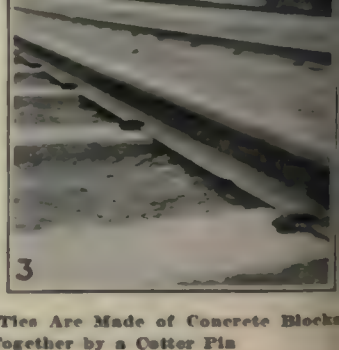
Detail of Spike and Spike Holes in Concrete Ties

The rail rests directly on the concrete, to which it is fastened by a spike of special design. This spike secures its grip by hooking under a in the lower part of the tie. projecting edge of concrete Driving the spike is facilitated by making it in two parts, which are inserted successively. After being inserted, the two parts are held in place by a cotter pin, as shown in the accompanying sketch.

Thirty ties of this type have been installed on the







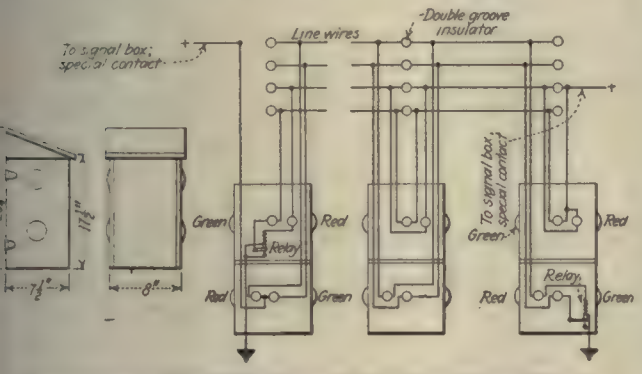
No. 1. Trial Installation of Concrete Ties on the Bangor Railway & Electric Company. No. 2. The Ties Are Made of Concrete Blocks Connected by Steel Rods. No. 3. The Special Spikes Used Are Made in Two Parts Held Together by a Cotter Pin

ampden line on private right-of-way, under the super-sion of E. W. Jennison, engineer maintenance of way. he ties are manufactured by the Maine Concrete Tie orporation, Corinna, Me. They present a neat and ttractive appearance, and so far as casual observations ow, they make a track structure with about the same ding qualities as track built with wood ties.

## Duplicate Signal Protects Blind Curve

ON A DANGEROUS stretch of single track where there is a combination of blind curve and steep rade on the lines of the Androscoggin & Kennebec ailway, Lewiston, Me., protection is afforded by a uplicate signal system. Several accidents have occurred this point, and investigation showed that confusion xisted at times in the matter of signals.

Chapman registering signals are standard on this ailway. In the rush hours, however, trippers operate




Connections of End Signals and One Intermediate Signal



These Signals Duplicate Indications at Entrance to the Block

through this stretch of single track in groups of four or five. As these cars follow one another rapidly past the signal contactor it is difficult to tell whether all cars register properly. In case the last car fails to register, it is, of course, left unprotected in the block as soon as the preceding car has cleared the signal. Under these circumstances, the car on the single track being out of sight around the blind curve, an opposing car might enter the block.

To eliminate this danger the railway has installed auxiliary signal lights at two points on the curve. Each auxiliary signal contains a red and green light electrically connected to the main signal system. When the registering signals are set for an outbound car in the block, green lights show in the auxiliary signals. If a motorman has failed to set the signal when entering the block these lights will not be burning. If by chance he should be in the block running against an opposing signal the auxiliary lights will be red. In this way, motormen after entering the block are reminded of the signals and know whether they are proceeding in safety or not.

The signal boxes were built by the railway at the suggestion of the Chapman Company. There are four circuits in each box, two for each light. An arrangement has been made whereby a relay closes the second circuit if the first burns out. This installation has saved the necessity for double-tracking this portion of the line.

# The Readers' Forum

### *Comment on Foreign Committee Report*

THE INTERNATIONAL REGISTER COMPANY

CHICAGO, ILL., Oct. 23, 1924.

To the Committee:

Not until this morning have I had an opportunity of glancing at your report, but I have the very handsomely gotten up pamphlet reprinted from the ELECTRIC RAILWAY JOURNAL of Sept. 20, 1924, and I have spent an hour or more this morning glancing it over and am now starting on a thorough reading of it.

First of all, it is evident from your itinerary trip on page 114 that this was no junket, and you fellows surely did lay out a hard road to travel and evidently traveled it. It seems to me that this extended and complete report of yours is pretty nearly a classic and is something that is going to be read very carefully and sometimes several times over by those having any interest whatever in transportation problems.

I think you are to be congratulated most heartily on this most wonderful report. It shows not only the diligent study and careful inspection of what you saw but that you have the ability and have used that ability to put the facts before us in such readable form and yet so thoroughly condensed.

JOHN BENHAM,
Vice-President.

---

From 300,000 to 400,000 miles without turning is obtained on the wheels of London Underground trailers by using "feroda" asbestos brake lining for the brakeshoes. Three or four layers of this material are bolted on to cast-iron backs held on the brakeshoe head in the usual way.

# Association News & Discussions

## New Englanders Resume Activities

### The Program at Boston Last Week Featured Maintenance, Education and Bus Application

THE first meeting of the New England Street Railway Club this season, held on Oct. 30, attracted a large attendance on account of the diversity of topics included and the caliber of the speakers. Afternoon and evening sessions were held at the Copley Plaza Hotel, Boston, President Thomas Kendrigan being in the chair.

At the afternoon session W. C. Bolt, superintendent of rolling stock and shops Eastern Massachusetts Street Railway, Boston, presented a striking paper on "A Comparison of Maintenance Costs of Old and Modern Car Equipment," giving the results of the application of improved methods with increased production and lessened costs at the shops of this important system, and this was followed by a paper by H. N. Ransom of the Railway Improvement Company, New York, on "The Lubrication of Railway Motors." Abstracts of these papers appear elsewhere in this issue.

Following the usual dinner, Edward Dana, general manager Boston Elevated Railway and chairman of the educational committee of the A.E.R.A., gave a short talk on "Education"; A. E. Potter, president United Electric Railways, Providence, R. I., read an extended paper on "The Co-ordination of Motor Vehicle and Electric Railway Service by Electric Railways," and R. D. Hood, general manager Massachusetts Northeastern Street Railway, Haverhill, Mass., spoke on "Observations at the Recent A.E.R.A. Convention." Mr. Potter's paper is published in abstract on another page.

In his talk on education, Mr. Dana pointed out that through proper training in industry, many a "round peg can get out of a square hole" and find increased usefulness in congenial and well-fitted tasks. He outlined the work of the American Electric Railway Association during the past three years in the educational field and said that this movement, like the original "safety-first" movement, is slowly making headway but is surely gaining speed and scope. Many agencies are available to help utilities in this work, and some of the larger companies are big enough to set up their own educational activities. At present the success of a good deal of publicity work is spoiled by the ignorance of employees. The speaker paid a tribute to the pioneer work of the Milwaukee company and commended the educational activities of the operating organizations at Fort Worth, Tex.; San Francisco and other places. He also referred to a useful pamphlet, printed by the A.E.R.A. educational committee, and entitled "Starting Educational Work on the Electric Railway."

Mr. Dana described briefly the work of the Boston company in the educational field. Several hundred men have taken courses under the auspices of the Massachusetts Department of University Extension during the past two years on the Boston system. This year 600 men are enrolled, and group conferences are planned at which talks will be given on various aspects of the company's departmental activities. Thus, in the maintenance group there will be a rolling stock session with talks on car-body painting and car repairs, and in the transportation department the fundamentals of operation will be set forth by qualified speakers. Each year in May there is a dinner at the end of the course, and the students have been addressed on these occasions by no less personages than the presidents of the Massachusetts Institute of Technology and Harvard University. The day will come, Mr. Dana said, when the Boston company will have its own educational director.

The educational committee does not propose to be a taskmaster to the industry, but merely to help in this work of organized instruction. In this connection Pennsylvania State College is preparing a practical, common-sense publication which will give in clear terms the fundamental economic principles of the public utility business.

## Reducing Maintenance Costs*

### Notable Savings in Cost and Greatly Increased Mileage per Pull-In Are Effected Through the Use of Modern Equipment

BY W. C. BOLT
Superintendent of Rolling Stock and Shops
Eastern Massachusetts Street Railway

THERE is a great difference between the service demands today and those of 10 years or even 5 years ago. Our standard of service efficiency has been greatly increased within recent years. We believe that on our property we have in a large measure met the new service demands of the riding public, and we are now able to operate approximately 1,700,000 electric railway passenger car-miles per month with approximately 100 car failures, resulting in car pull-ins.

It has become necessary in recent years to add a great many detailed equipment parts, including pneumatic door-operating equipment, folding doors, heat-regulating equipment, variable load brake equipment, destination signs, emergency air-brake equipment, air-sanding equipment, pneumatic snow scrapers, better lighting equipment, electric contactors and many other refinements. All of these parts necessarily require careful inspection, attention and maintenance. We cannot regard the cost of maintaining the modern car in the same light as the cost of maintaining the old simple car. It is wise business policy to provide each year some new equipment and replace old equipment which has become obsolete. Yet by scientific study the cost of maintaining our present modern cars has been reduced to a very low figure.

Our cost of car maintenance since 1918, in cents per revenue car-mile, is given in the accompanying table. This cost excludes all fixed charges, such as depreciation and retirement of equipment, and represents only the following Interstate Commerce Commission accounts:

| |
|---|
| 29—Superintendence of equipment |
| 30—Maintenance of car bodies, trucks and air brake equipment |
| 32—Maintenance of brakes and service cars |
| 33—Maintenance of electrical equipment |
| 36—Shop tools |
| 37—Shop expense |
| 39—Miscellaneous equipment |

The average age of our car equipment, as of Jan. 1, 1920, was 12 years, some cars being 22 years old. The average age of our passenger equipment as of Jan. 1, 1924, was 7 years, there having been added to our complement of equipment within the last 4 years 225 safety cars and 75 double-truck, light-weight cars.

Our maintenance figures, as given in the table, include the cost of maintaining our rather extensive fleet of snow-fighting and service equipment, comprising 11 double-truck service cars and 114 snow-fighting units, of which 84 are double truck and 30 single truck. The expenditure for the year 1923, for instance, for rehabilitation of snow-fighting equipment was $103,000.

We likewise include in these expenditures all indirect expense at our two major shops, such as services of watchmen, janitors, firemen, the expense of heating the shops, cost of a.c. power for operating machinery and the d.c. trolley power used in the shops on a basis of 2 cents per kilowatt-hour. The figures also include the cost of inspection of equipment at carhouses, some-

*Abstract of paper presented at a meeting of the New England Street Railway Club, Boston, Mass., Oct. 30, 1924.

times charged to the operating group of expenditures. On the Eastern Massachusetts Street Railway this expense is considered a part of the maintenance of equipment group and represents approximately 0.7 cent per car-mile.

While the cost of maintaining our equipment as a whole is now 3¼ cents per car-mile, we have some divisions where this cost is only 1.6 cents per car-mile. This figure, by the way, represents the actual cost of maintaining 10 standard Birney safety cars for a period of 44 months. These 10 cars during this period have made approximately 1,200,000 car-miles. Each car has had two complete shop overhauls and painting, one at the end of 60,000 car-miles and another at the end of 120,000 car-miles and each car is today in first-class mechanical condition. In other words, there is no deferred maintenance on these 10 cars. The cost of 1.6 cents per car-mile may be classified as follows:

| | Cents |
|---|---|
| Carhouse inspection labor per car | 0.425 |
| Replacement of rapidly wearing parts at car houses | 0.250 |
| Shop expense, including overhaul and paint | 0.925 |

We define a car pull-in as "any car removed from service prior to completion of its regular prescribed run, for any mechanical or electrical failure." In July, 1920, we had 222 cases of air brake failures, 180 cases of controller failures, 339 cases of hot bearings, 101 cases of wire and cable failures, and numerous others, aggregating a total of maintenance pull-ins of 1,489, or a pull-in for every 1,400 miles. In September of this year we had a total of 104 car pull-ins, or one pull-in for every 14,500 miles. Even now we have a wide variation as between our several divisions. One of our larger divisions is now operating 75,000 car-miles for every car pull-in. These two illustrations clearly demonstrate the changed conditions. The table also gives the car-miles per maintenance pull-in from 1920 to date.

In July of 1920, when we operated a large proportion of old type equipment, we employed 346 so-called "carhouse employees," this representing one employee for every 6,000 passenger car-miles. At present our carhouse organization comprises 132 employees, or one employee for every 12,000 car-miles. Similarly at our major shops in July of 1920 we employed 447 employees, or one employee for every 4,700 passenger car-miles. Today we are employing 188, or at the rate of one employee for every 8,400 car-miles.

### Meter Records and Other Improvements

Early in 1921 it was decided to place our car maintenance on a systematic basis, and power meters were installed on each active car equipped with so-called "inspection dials." These inspection dials have materially assisted us in determining promptly and at minimum cost when individual cars become due for attention.

In 1921 we established a shop overhaul schedule of 30,000 car-miles. This was later increased to 45,000 car-miles. As rehabilitation of our equipment and materials of more suitable design and size were installed, the overhaul interval was later changed to 60,000 car-miles, and now all of our modern equipment cars are overhauled on a basis of 75,000 car-miles.

TABLE SHOWING DATA ON CAR MAINTENANCE, EASTERN MASSACHUSETTS STREET RAILWAY

| | Total Charges to Car Maintenance, Exclusive of Depreciation and Obsolescence | Cost of Car Maintenance, Cents per Car-mile | Wage Level, Cents per Hour | Average Maintenance Pull-Ins per Month | Car-Miles per Maintenance Pull-In |
|---|---|---|---|---|---|
| 1918 | $1,361,000 | 5.02 | 37.0 | ..... | ..... |
| 1919 | 1,485,000 | 5.70 | 48.0 | ..... | ..... |
| 1920 | 1,418,000 | 6.20 | 58.0 | 1,203 | 1,550 |
| 1921 | 915,000 | 4.63 | 57.0 | 869 | 1,884 |
| 1922 | 857,000 | 4.42 | 54.5 | 414 | 4,035 |
| 1923 | 797,000 | 4.06 | 56.0 | 248 | 6,745 |
| 1924* | 650,000 | 3.54 | 58.0 | 163 | 9,638 |

* First nine months of year.

NOTE—Figures for car maintenance include cost of car overhauling and repainting.

Our car maintenance today is carried out according to this schedule, and we are able through this means to maintain our equipment efficiently and at minimum cost. We have planned our work so that our organization is kept at a constant size, thus assuring the highest standard of work on the part of each workman. Each man is a specialist in his particular duties and he has no fears that he will shortly be without a job.

This plan has enabled us to reduce our carhouse requirements for small, rapidly wearing parts from a total of $190,000 in 1921, or approximately 1 cent per car-mile, to $87,000 for the year 1924, or less than ½ cent per car-mile.

Modern practice, together with modernization of equipment, has contributed largely to our substantial reduction in armature failures. In 1920 we were having armature failures at the rate of 500 per month. These failures were largely on motors of the old types, including GE-67, GE-80, GE-57 and GE-1,000, these representing 12 per cent of the total motors in service which failed during the one month period. At present our failures aggregate 65 or 70 per month, or 1.7 per cent of the total in service.

In 1920 we operated less than 5,000 car-miles per armature failure. Now we operate approximately 30,000 miles per armature failure, and this record could be substantially increased if these failures should be burdensome. It still is our practice, however, to run some of our armatures to the point of breakdown, thus securing maximum life of the armature winding. Every armature on our property is dipped and baked and thoroughly tested every 60,000 or 75,000 car-miles, and this procedure has very materially decreased our armature troubles.

Similarly, thorough examination, testing, dipping and baking of field coils every 75,000 car-miles has reduced our field coil failures from some odd 300 per month in 1920 to practically 100 per cent performance. As a matter of fact, we have not purchased any new field coils for some two or three years.

Modernization of our air brake equipment has produced results. In 1920 we had an average of 80 AA1 air armature failures per month, this representing approximately 12 per cent of the total number of AA1 air compressors in service. Today an air motor armature failure is practically unknown.

Substantial progress has been made in the matter of car lubrication. In 1920, with a larger proportion of old type equipment, we were using at the rate of from one to 1¼ gal. of car oil per 1,000 car-miles. We are now using less than ½ gal. of car oil per 1,000 car-miles. I think, however, that our lubrication methods are still crude and that further progress can be made in this direction, not only for savings in oils and greases, but also in bearings themselves. Dust and dirt today are responsible for a great deal of wear in armature and axle bearings, and as soon as bearing housings are so constructed as to keep dirt and grit from getting into the wearing surfaces further savings will be possible, this affecting not alone oil and bearings, but also the rotating shafts. When this has been accomplished, we may expect perhaps 150,000 or 300,000 car-miles per set of axle and armature bearings, as distinguished from the 75,000 car-miles which we are now securing on our modern motors.

To overcome frequent resistance failures on our safety cars we have, within the past two years, installed the resistance on the roof of the car, and during the past winter we had no resistance trouble on cars which had been so arranged.

We believe in frequently repainting our cars, but by the paint-spraying system our repainting costs have been substantially reduced. We have always felt that the light yellow color with which our cars were painted has made the cars easily visible and has had a tendency of avoiding a great many accidents.

Within the past year we have removed cumbersome draw bar and fender apparatus from our cars. This has tended to eliminate at least some of the ordinary rattles and has also saved some weight.

Welding equipment has played an important part in our campaign of cost reduction. Many equipment parts are constantly being repaired and the purchase of new parts has been avoided. A great deal of welding has been done on our car trucks, so that they now operate with less noise and rattle than heretofore.

### Double-Truck, Light-Weight Car

This discussion would not be complete without mention of the so-called "double-truck, light-weight car." We cannot always justify the purchase of new equipment entirely through anticipated savings in the cost of maintenance. This is particularly true with light-weight cars. While some savings in maintenance may be expected, the larger savings accrue from reduction in power consumption and the lessened wear and tear on tracks. The latter two items of saving should easily pay for the fixed charges on the new investment. Our records indicate that the total cost of maintaining a double-truck, light-weight car, weighing per-

haps 32,000 lb. and equipped with four 25-hp. motors, together with all of the other modern appurtenances, would be in the neighborhood of 2 cents per car-mile for the first 100,000 car-miles. This figure would include the reconditioning of each car at the end of this mileage interval. If we did not include the cost of reconditioning, the cost would be approximately 1.2 cents. During the second cycle of 100,000 car-miles this cost would be slightly increased.

I attribute the success of the Eastern Massachusetts Street Railway and its present wonderful financial stability in no small part to the savings made in our maintenance of equipment as outlined. Modern equipment systematically maintained will result in efficient and uninterrupted service to the public and in low cost of maintenance.

# Seven Kinds of Bus Operation*

## United Electric Railways of Providence Has Already Undertaken Five Different Classes of Service—Direct Profit Is Not Expected—Chartered Buses Are Good Revenue Producers

By A. E. Potter
President United Electric Railways, Providence, R. I.

WHEN the United Electric Railways formulated a program for the operation of buses it had seven plans of operation in view. The transportation system in Providence radiates from the center of the city like the spokes of a wheel, with Pawtucket and Woonsocket lying to the north and having similar radiating lines. Cranston is to the south and Arctic and the rest of the Pawtucket Valley to the southwest.

Plan No. 1 was to provide both local and express service, either the buses furnishing the local service and the electric cars running express, or vice versa. This method has been adopted on Broadway between the center of Providence and Olneyville Square. [See ELECTRIC RAILWAY JOURNAL for March 15, 1924.] The Broadway bus line shows earnings of 36.02 per cent per bus-mile for the nine months ended Sept. 30, 1924, and indicates what may be expected of bus operation on lines where there is some density of traffic.

Operation of cars running local between Providence and Pawtucket and buses running express was also considered. Pawtucket is a community of some 75,000 people, lying about 4 miles to the north of Providence. The reasons for considering a different arrangement were that the car lines between Providence and Pawtucket terminate in Pawtucket, and that four car lines operate to Pawtucket, branching out in four directions after leaving Providence. It was planned to reverse the Broadway operation and run the electric cars local and the buses express. Nothing has been done in inaugurating this type of service because part of the highway over which the electric cars operate has been widened and passing tracks installed and express electric car service established. [See ELECTRIC RAILWAY JOURNAL, July 12, 1924, page 45.]

Plan No. 2 was to provide direct interurban limited stop express bus service or to supplement electric car service on high-speed interurban lines which stop only at stations. A direct limited-stop express service has been put into operation, known as the Arctic bus line. Arctic is a community in the center of a mill settlement of more than 15,000 inhabitants, approximately 10 miles from Providence. There are also other settlements along the car line between Providence and Arctic, and to serve these other settlements the line takes a somewhat circuitous route. This is shown by the fact that the running time of the car is 70 minutes, against 40 minutes for the express bus.

There are independent jitneys operating on this line, this time being the one instance where the Public Utilities Commission granted the petition of several jitney operators for certificates of necessity. The decision was based on the fact that this route paralleled no tracks and the jitney route was established before the United Electric Railways began bus operation.

At first a street car type bus was operated. However, on March 4, 1924, three parlor car buses were put into operation and the patronage on this line increased considerably in a short time. But the mill depression, which has been particularly severe in Arctic and the vicinity, has of course been reflected in the revenue. Recently some of the independent operators who had been operating built-over touring cars have substituted 20-passenger buses. This bus line, with earnings of 24.22 cents per bus-mile for the nine months ended Sept. 30, 1924, should be one of the best paying bus lines operated by the company, and would be were it not for the fact that jitneys leave just ahead of the buses of the railways. There does not seem to be sufficient business for all and it is a question which can survive the longer.

The United Electric Railways is operating buses to supplement its car service on a high-speed interurban line between Providence and Oakland Beach, approximately 12 miles in length. The car line operates for a great part of the distance over a private right-of-way and stops only at stations. There are, however, scattered colonies along the line and in many instances a walk of a mile or more is necessary to reach a station. This bus line parallels the car line, following the state road, and passes through the several scattered colonies which are not served by the high-speed electric car line, cutting across country and crossing the electric car line at three points. Buses stop on signal. The colonies along both these lines are essentially summer resorts and in the winter both car and bus service is considerably reduced.

This bus line for the nine months ended Sept. 30, 1924, earned only 24.50 cents per bus-mile and should not be operated in the winter months except for the fact that it serves territories that are more or less remote from the trolley stations. In the summer it shows earnings in excess of 32 cents per mile.

Plan No. 3 was to furnish auxiliary service on heavy riding car lines. This type of operation has not been put into effect although it has been considered. Such lines may be relieved in the downtown congestion by supplementing the car service with bus service and using streets for loading where there are no tracks.

Plan No. 4 was to furnish auxiliary bus service on lines where the present car service has outgrown the existing turnouts, and where the street is not sufficiently wide to permit of double-tracking. As yet nothing definite has been done by the company in carrying out this program, although it has been considered in connection with two single-track lines on which it was becoming difficult to operate cars on schedule during the rush hour. The business depression, however, has lightened the traffic on these lines to such an extent that for the present it is not necessary to consider bus operation.

Plan No. 5 was to replace suburban car service with bus service where such lines are not earning sufficient revenue to take care of construction and renewal charges of track, overhead lines and substations. The United Electric Railways' greatest development in the bus field will shortly be in operating buses where car service has been abandoned. As an illustration of such operation the Pawtuxet-Lakewood line, slightly more than a mile in length and connecting the end of one line 5 miles out of Providence with a point about 5 miles out on another line 13 miles long, never paid the full cost of operation. The tracks for a part of the route were along the state highway and the State Board of Public Roads notified the company that the state intended to rebuild the highway. This would have necessitated renewing a portion of the track, at a cost in excess of the price of a modern 29-passenger bus. Accordingly, the company took up its track and substituted bus operation, thus reducing the losses on this line. This bus line earns only 5.50 cents per bus-mile.

Car service will be abandoned shortly on the Woonsocket-Nanville line, approximately 6 miles in length. The line is a rather circuitous route, with a mileage of 5.93 against 3.40 for the bus. Permission has been obtained for the operation of this line, but the company has been waiting for the highway over the proposed route to be rebuilt.

Two other suburban lines, the Providence-North Scituate and the Barrington-Warren and Bristol, have operated at a heavy loss for some time. Buses are now on order for operation on these lines and deliveries are expected early in November. As soon as the buses arrive operation will be started.

Plan No. 6 was to provide feeder bus service in territories which have no car facilities, but which are not sufficiently developed to warrant the capital expenditures necessary for track and over-

*Abstract of a paper before the New England Street Railway Club, Boston, Mass., Oct. 30, 1924.

head lines. One such bus line, the Pawtuxet-Warwick Downs, is in operation. It is approximately 1¼ miles in length and serves a summer colony. Only a few trips night and morning are run in the winter, although all-day service is given in the summer. Previous to inauguration of bus service, the residents had no transportation service whatsoever, either summer or winter, except what they could provide for themselves. This bus line showed earnings of 12.02 cents per bus-mile for the nine months ended Sept. 30, 1924, although in the summer months it shows earnings of about 20 cents per bus-mile.

Plan No. 7 was to provide crosstown bus service to connect up existing car lines or to provide a means of transportation between two or more communities each in the same section of the city where there is a community interest, but which communities cannot be reached by cars except by taking a roundabout way through the center of the city. One such bus line is in operation in the outer district of Providence, known as the Olneyville-Eddy Street crosstown line. It is located about 2 miles outside the business center of Providence and operates from Olneyville to Eddy Street, a distance of 2¼ miles. It crosses six existing car lines and connects with a car line at each terminus of the line. At both termini of the line there are a number of mills and factories. Many of the workers in these mills and factories live along this bus route or continue their journey on one of the electric car lines which the bus route crosses or connects with. Transfers are issued to and from the electric cars and buses on this particular operation. The line for the nine months ended Sept. 30, 1924, shows average earnings of 31.12 cents per bus-mile.

The United Electric Railways has not found that the bus business is profitable, as is indicated by the earnings on the lines as a whole. The Broadway bus line and the Eddy Street crosstown bus line are more than meeting the cost of operation. Other of the bus lines are not meeting the cost of service, nor was it expected that they would at the time they were inaugurated. The Pawtuxet-Warwick Downs, Providence-Oakland Beach and Providence-Arctic lines were put on to serve territory that was not served by the cars or that could be served better by buses. The Scituate and Barrington-Warren and Bristol bus operation is to be operated to reduce the losses due to heavy track maintenance.

The company has just offered some of its bus equipment for special or chartered bus service. It was believed that spare bus equipment might be profitably used for this type of service and this belief is borne out by the fact that in the month of September, 1924, the earnings were 83.15 cents per bus-mile. However, due to the irregularity of the demand for this service, the investment charges for equipment used in this service would be excessive were it not for the fact that this extra equipment is used from time to time in regular service.

Most of the non-paying bus lines and car lines act as feeders to the rest of the system, so that the car rider on the profitable lines is not actually obliged to pay any substantial sum on account of the rider on the unprofitable lines. Provided the operation of these non-paying car and bus lines is not overdone, it constitutes one of the advantages to the car rider and the community of a unified system of transportation, with a co-ordination of electric car service and bus service.

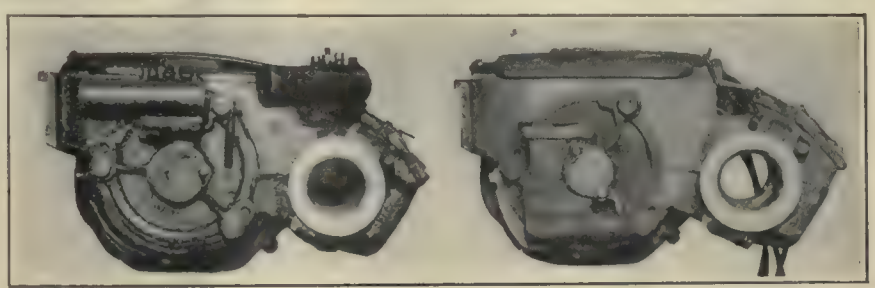
# Obtaining Longer Life from Motor Bearings*

## Important Maintenance Considerations Include Keeping Bearings Tight in Housings or Motor Frames, Keeping Out Dirt and Water and Providing a Moving Oil Film in Bearings

By H. N. Ransom
Sales Manager Railway Improvement Company, New York, N. Y.

AT THE recent convention of the A. E. R. A. at Atlantic City, I was admiring the bearings of a railway motor and I asked the designing engineer this question: "If that motor was operating under load in this clean hall, and a can of oil was suspended over it, dropping oil every few seconds into the bearing housings, how long do you think the motor would run?" His answer was: "Longer than you and I will live."

When I inspected another exhibit showing a side roller bearing, I was told by the engineer that they did not lubricate these bearings, due to the fact that oil or grease would collect dirt and grind the bearings out.



At Left, New Design of Axle Cap with Bearings Turned to Use a Solid Lower Half. At Right, Original Axle Bearing Arrangement

We all know that power-house apparatus and all types of stationary motors will run for years, and the bearings never seem to wear out. Last week I saw such a motor that had been in operation more than 20 years. If any engineer is asked why these bearings last longer than railway motor bearings, the answer always is: "Look where the car motor operates in all the dirt and water." If that is so, then how are the excellent results that are obtained from the bearings in air compressors accounted for? They are subject to exactly the same conditions as a railway motor. Why should one big railway spend in one year for motor bearings $22,300 and use only six bearings in its air compressors?

Did you ever stop to think that the four bearings in your motors must be true and the clearances held to a minimum so that motor axle and shaft will be in line and operate under the conditions for which the engineers design it? There are four bearings in the transmission case of your automobile, and you all realize that all these bearings must be O. K., and not just two of them.

Careful attention is given to the armature bearings of railway motors due to the fact that the air gap tells the story, and it costs big money if the armature goes down on the pole faces; but how about the wear on axle bearings? Are they given the same care and attention?

The gear and pinion manufacturer has a perfect right to expect his gears and pinions to be operated within a safe margin for clearances of bearing wear. Loose axle bearings are as dangerous to gears and pinions as are loose armature bearings. From a half to two-thirds of the mileage of motors is lost by axles and shafts being out of proper alignment.

You are all 100 per cent on dipping and baking. Then why lose the good from such a process by allowing a hammer blow that will take place when the gear and pinion are not properly in mesh? These blows will loosen any armature coil and reduce the benefits from dipping and baking. I would suggest that you take your shop men out in one of your cars, operate it on a hilly route, open up the trapdoors, remove the gear case and watch what happens when the axle bearings and caps are worn and loose. An object lesson of this nature is often worth hours of talk.

Motors are manufactured with a clearance between the shafts and bearings to take care of metal expansion and to allow room for the oil. An armature shaft does not revolve on a bearing. It revolves on a sleeve of oil that in reality can be considered as a liquid bearing. How wonderful it would be if some one discovered a process whereby you could pour metal in a housing and form a new bearing without the great expense that is necessary to bring the motor into the shop and

*Abstract of a paper before the New England Street Railway Club, Boston, Mass., Oct. 30, 1924.

open it up. In one sense that is just what can be done with oil, if the sleeve of oil is not broken or destroyed by water. The oil sleeve keeps the shaft off of the bearing, and it is cheaper to wear out the oil than the bearing. To obtain maximum bearing wear, this sleeve of oil must be maintained and the shaft protected from pounding and wheel wash.

If you take a motor with an extended armature shaft and slip on an extra bearing, you can hold this bearing in your hands with the motor in operation, if the bearing is lubricated. If water is poured in this bearing the twist will tear it from your grip. That is exactly what occurs in a motor when water enters the bearing, as the condition of the key, dowel pins and holes all goes to prove. These bearings are allowed to twist themselves loose and naturally wear on the outside, and also wear the frames or heads as well as the axle caps.



A New Design for the Housing Has Permitted the Use of Bearings with Reduced Size of Windows. No Keys Are Required to Hold the Bearings and Larger Bearing Surface Is Obtained. At Left, Old Bearing. In Center, New Type. At Right, Housing Without Keys to Hold Bearing

When new motors are put in service, the first bearing mileage is tremendous. After replacing the bearings the mileage from the second lot is hardly a quarter of that obtained from the original, because these are not held tightly in the motor frames or housings. Water enters the bearings and the shafts pound, which results in destroying the sleeve of oil that the shaft is supposed to run on.

As the clearance in the frames or housings increases some try to correct it by the use of shims. The wear that has taken place is not even, consequently it is practically impossible to obtain a perfect fit for a bearing by the use of shims. This also applies to shimming of housings in motor frames. More bearings and housings are ruined from this cause than any other. If you will spin your motors with power when assembled, you will be in a position to judge whether the bearings are pinching or not, and it is far cheaper than having the car sent back to your shop with a hot bearing.

If a motor is worth a set of new bearings, it should be put in condition to receive these bearings. When you changed from split to solid gears, you depended upon a key for safety. Today you know that with a proper fit the key is not necessary. The same principle applies to a bearing in a housing. If the waste window is not too large, the bearing will not buckle when pressed in the housing and the fit can be correct and held so, which will eliminate the use of keys in armature bearings. I know of hundreds of motors that are in operation that do not depend on keys to hold their bearings in the housings. The next time it is necessary to remove a bearing from a housing, record the pressure required and check this against the pressure the manufacturer used when the motor was assembled. I believe it is around 4 to 5 tons.

You are all welding and know you are saving money, and how essential your welding outfit is to your shop. Then why not weld and bore your motor frames and axle caps? Is it that you cannot afford to bore, since the welding is not expensive? Welding and boring cost less per motor than a set of new bearings, as is shown by a road that has just finished boring and welding 8,000 motors. Its record shows the bearing life has been tripled. You can also save pounds of metal in your bearings, as many of the old motors have bearings that will permit a cut in weight of nearly 50 per cent. You can also reduce the size of the waste window in both armature and axle bearings, which gives more metal to run on. A road operating high-speed service and using 7½-in. axles, by welding has been able to turn the bearings in the caps and use a solid lower half. The upper half is practically solid as only a 2-in. hole for the waste to come in contact with the axle is used, and as this hole is at the top the pounding really holds the waste to the axle and does not cause it to sag or drop away. This road is obtaining six times the previous life of its axle bearings.

I realize that most of the roads have specifications that call for well-chamfered bearings at the waste windows, but there are many bearings the edges of which are entirely too sharp, and I believe that it would be wise to have your men check this before the bearings are put in motors. A very good way to impress your men in regard to this point is to take a top feed motor and use a bearing properly chamfered on one side and one having sharp edges on the other. See that the clearances are kept to the minimum. Remove the waste and put in a cup of oil in each housing. On one side the oil will disappear around the bearing, while on the other it will be thrown out of the housing.

Use good wool waste. It's money saved, and remember that in the late type of motors with oil wells the wa will only lift oil 3 in. There is a d ference in the feed of oil to the sh of 8 to 1 when oil in the window lowered an inch. Many of the ros change from summer to winter grad of oil to counteract the change in te perature, but forget that a motor subject to both electrical and mecha ical heat. Heavy grades, trailers, and short circuits and stuck brushes w cause a variation of the motor temper ture far greater than winter to summ climate conditions. It is most esse tial, if you wish to retain your slee of oil, to have oil in the bearing a not in your store room. Any beari that shows oil coming out of the e is being well lubricated, and water ca not enter.

## Dr. de Ferranti Honored

A LUNCHEON was given at t Yale Club in New York, on Nov. by the Founders' Societies in honor Dr. S. Z. de Ferranti. John W. Li vice-president New York Edison Co pany, acted as toastmaster and tended the hand of professional fello ship and greeting to the guest of hon and spoke in a most complimentary w of his genius, broad vision and extra dinary ability as an engineer.

Dr. de Ferranti is president of F ranti, Ltd., England, and one of t world's best-known engineers. He w one of the first to see the field of t central power station, and he has be the inventor and the first to demo strate the use of many of the develo ments which can be said to be respo sible for the tremendous growth of t use of electricity. He is a past-pre dent of the Institution of Electri Engineers of Great Britain, a memb of the English civil and mechani societies, and an honorary member the American Institute of Electri Engineers.

Mr. Lieb called upon Fred R. Lo editor of *Power* and president of t American Society of Mechanical E gineers; Alex Dow, president Detr Edison Company and representing t American Society of Civil Enginee J. V. W. Rinder, president-elect of t American Institute of Metallurgi and Mining Engineers, and Calv Townley, past-president of the Am ican Institute of Electrical Enginee who expressed the felicitations a welcome of the four founder societi

Dr. Ferranti responded. He show his broad concept of the engineeri profession when he said that engine ing is the accomplishment of gre things for the benefit of the communit Engineers work to do these thin on such a scale and at such a c that they can become available to the people. He considered electrici as the greatest of labor savers and th it is of the greatest possible good the whole of the people of any of t engineering products. He felt th there was nothing more worth wh than to pursue its ultimate develo ment. He reminisced on some of t original problems that he had had work out in the very early stages electricity supply in London a greatly interested his audience of l admirers. But he said the field st open for development is even great than the accomplishments already ma

# American Association News

## Obstruction Is Necessary to Real Progress*

### At the Risk of Being Considered Reactionary Railway Men in New England Oppose Bus Operation Where This Would Duplicate Existing Service

By ROBERT H. NEWCOMB
Assistant to the Vice-President New York, New Haven & Hartford Railroad

WITHIN the past few years there has grown up in New England a new form of transportation, the value of which, in many cases, is very doubtful and the permanence of which is even more open to question. This development first confined itself to the carriage of freight over highways in motor trucks, but more recently the passenger bus has been added. The tremendous pressure of business incident to the World War was largely responsible for the first. It is probable that the activities of the bus builders are responsible for the great recent growth of the second.

If this development has come to stay, and apparently to some degree it has, then, in all fairness to every one, motor vehicles should be subject to the same regulations as are the railroads, and should show before they are allowed to operate that public convenience and necessity are to be served by their introduction. Anything less than this is unfair to the older forms of transportation. This applies with equal force to the steam railroads and to the electric street railways. Both existing forms of transportation face the same results if unregulated competition is allowed to continue. Both work under franchises which have great value and the maintenance of service under these franchises is of supreme importance to the people of New England. If, then, we are to have a third factor introduced into the problem of transportation, surely that factor should be limited and controlled as are the two others.

The present situation in Massachusetts demands attention. Too much leeway is permitted the bus and too little regulation covers its operation. In fact, there is no regulation whatever. Beyond securing a local license nothing is required in Massachusetts. It is significant that failure to secure a local license has seldom acted as a deterrent. The situation in Rhode Island and Connecticut is better. In those states it is necessary to secure a certificate of convenience and necessity before a license to operate is obtained. It is not at all clear, however, that even there the commissions have deemed it best to prescribe rates, routes and service to the extent that these are prescribed for street railways and railroads. As far as it goes, therefore, regulation in Rhode Island and Connecticut is sound.

Recently a new angle has been added to the problem. It is now being contended that where a bus line operates between cities in different states neither state has authority over its operation. No state can prohibit or unduly restrict interstate business, but surely each state may exercise its authority over the use and abuse of its highly extensive road system. If the reasoning of the bus men is sound, then no commission or legislature has authority over local railroad service, nor the right to issue charters and enact laws governing transportation agencies which cross state lines. In a community of short distances like New England any such rule becomes absurd.

If there is any railroad man who thinks that the passenger bus can be abolished he certainly is suffering from a condition which is likely to prove fatal to his employment. We must concede that the bus is here to stay. Our problem is to find a way to co-operate with it and to secure a condition which will place all carriers on the same footing. In the course of this last effort it will probably be inevitable that the railroads appear to be standing in the way of progress. As a matter of fact this is not at all what the railroads propose. But unlimited and unrestricted free use of the highways to the injury of all concerned is not necessarily progress. It may mark an increase in bus output at the factory, and it may be progressive when viewed from a salesman's standpoint alone. Present conditions, however, do not, and never can, make for permanent progress. Progress is not a selfish thing. The present situation has selfishness for its only excuse.

At the risk, therefore, of temporary misunderstanding it will be the policy of the New England railroads to tell the truth about the situation. Where buses operate in territory adequately served by present facilities objection to their continuing will be raised and insisted upon. If they are allowed to skim the cream of the income, then existing service will have to be reduced. This is not said as a threat. It is a statement of simple business law. No manufacturer can go on indefinitely producing a product for which there is no sale.

So long as a good sized slice of the taxes paid by the railroads is spent to maintain highways which are free to buses and trucks in competition with those railroads, just so long will the railroads persist in an effort to have the tax situation corrected and the bus and truck contribute their fair share of the general burden. So long as the railroads are supervised by public service commissions, regulated as to rates, service, and the like, then just so long will the railroads strive to have exactly the same supervision and regulation extended to buses and trucks. To combat the situation the railroads stand united. Progress to be permanently beneficial must be based on fairness to all, and not on the selfish interests of the few.

*Abstract of a paper presented before the company section meeting of the United Electric Railways, Providence, R. I., Oct. 3, 1924.

## "Shop Early" Campaign Renewed

SO SUCCESSFUL was the industry in the use last year during the holidays of the "Shop More from 10 to 4" posters that the committee on publicity has recommended that a more intensive campaign be made this year to encourage off-peak-hour shopping.

Therefore, the "Shop More" poster used last year has been revised so that it appears in more striking colors. This poster can be obtained from association headquarters in New York in the form of gummed stickers, window posters, window cards for stores and single, double and three-column mats for use in newspaper ads.

Many companies which used these posters last year state that they found it very easy to obtain the co-operation of merchants in this shop-early effort. Experience has shown that once it is made clear to the merchants that it is as much to their advantage as it is to the street car companies to scatter the traffic throughout the day, they are willing to lend their aid.

## Special Reports Available

THE Bureau of Information and Service of the American Electric Railway Association announces that the following special reports have been prepared and are available to member companies in good standing upon request:

*Customer and Employee Ownership of Electric Railway Securities:* Gives summarized accounts of campaigns by exclusively electric railway companies to sell their securities to their employees and the local public, including data on amount of securities sold, number of new security holders obtained, methods of conducting campaign, samples of publicity work, cost of selling campaign and opinions of executives as to the benefits derived.

*Transportation Service by Motor Bus Lines:* Results of an investigation made to determine the kind of transportation service, if any, now being given in territories where electric railways have completely abandoned service.

*Wages of Employees Other than Trainmen:* Compilation based on the reports of about 175 companies showing their classifications of employees and the wages paid in their shop, carhouse, way and structure, power, overhead line and storage departments.

*Series of Charts Illustrating Developments in Electric Railway Industry:* Reproductions of charts first exhibited at the Atlantic City convention covering growth of electric railway riding habit, effect of automobile operations on electric railway traffic, recent trend of electric railway traffic and trend of revenues, expenses, wages and fares.

In addition to the above, supplements to the wage bulletin, fare bulletin and the cost of living studies have been prepared, bringing them down to date.

# Maintenance of Equipment

## Roof Mounting of Motor Resistors

By H. T. Hurlock
Engineer of Rolling Stock and Shops, Eastern Massachusetts Street Railway, Boston, Mass.

THE mounting of motor resistors beneath the car body is generally recognized as good practice and under ordinary conditions proves quite satisfactory. The single-truck Birney cars on this property, however, have been exceptions.

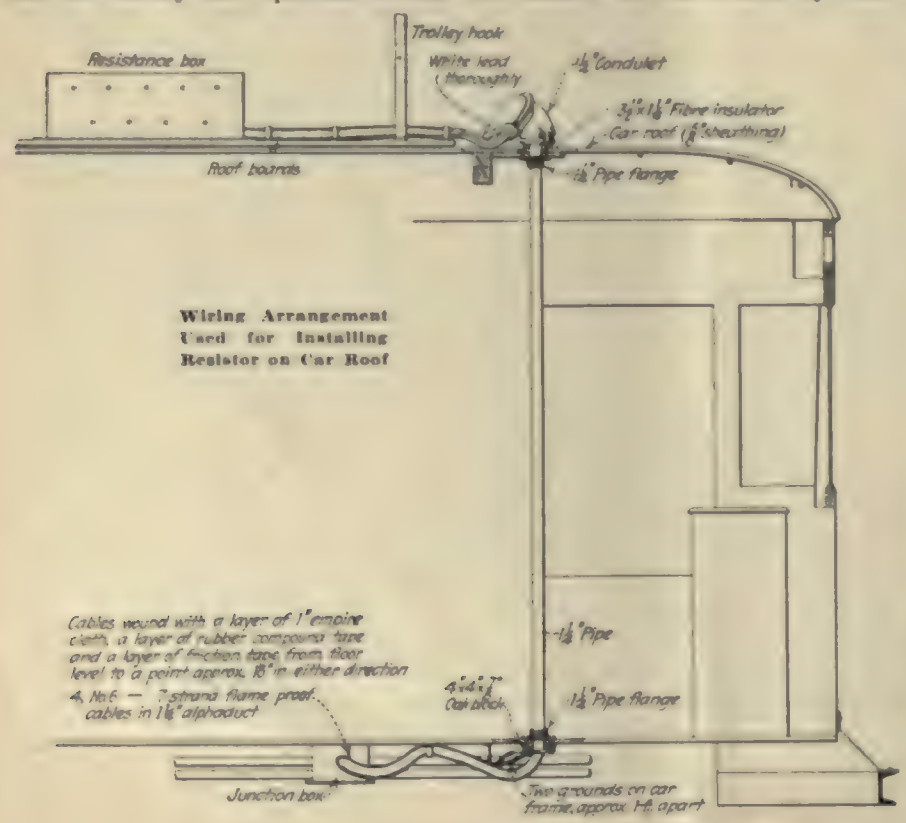
The only available location for the resistors on this type of car was under the platform, where the necessary protection against dirt and water could not be obtained even with a generous application of splash guards. During the winter, the undersides of these cars became thoroughly saturated with water and a most careful installation did not prevent the frames from grounding. Because of low floors, the resistors were necessarily close to the street, and being located at the front end it was not uncommon to have the light-weight grids broken by stones or covered with ice and snow. Of the 154 Birney cars operated in the territory north of Boston during the winter season of 1922-1923, 84 were removed from service for resistance trouble, which constituted the largest cause for pull-ins on cars of this type.



Resistor Installed on Roof of Car

As a result, it was decided to locate the motor resistors on the roof. Five experimental cars were placed in service for several months, and the improvement shown was so great that plans are under way to make the installation on some 225 cars. To date 150 cars have been modified, and over an average period of six months there has been but one resistance failure and that due to breakage from vibration.

It was realized that an additional fire hazard was introduced by locating the resistors on the car roof. For this reason special precautions were taken to make the installation fireproof. The single frame is totally inclosed in a box of asbestos lumber, perforated with 1-in. holes for ventilation. The top and sides are held together by iron straps and hinged at the rear, permitting the box to be raised for inspection. The resistance leads are conveyed to the roof in a 1¼-in. iron conduit and brought out at the top through an inverted type condulet. The conduit itself is thoroughly grounded to protect passengers. It is separated from the roof condulet by a 1¼-in. fiber bushing. The arrangement prevents water from entering the conduit and at the same time eliminates the possibility of fire due to the trolley wire coming in contact with the metal roof condulet. Flameproof wire is used for the resistance leads.




Wiring Arrangement Used for Installing Resistor on Car Roof

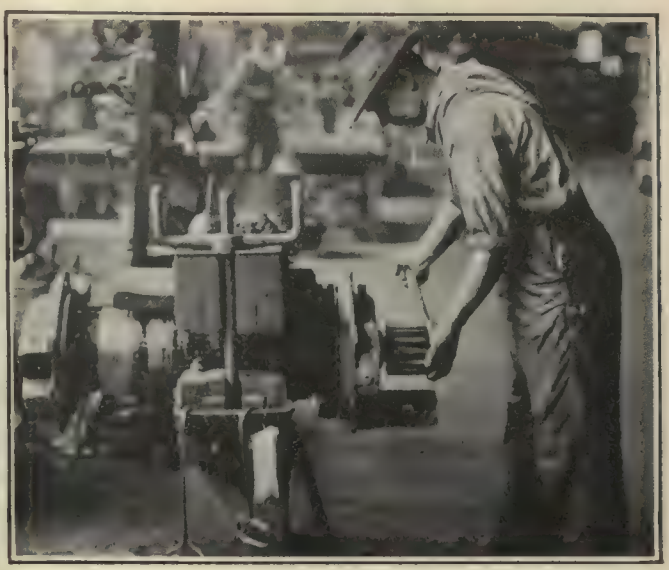
## Air-Operated Arbor Press Makes Handy Shop Tool

AN OLD hand-operated arbor press, equipped with an air-operating cylinder in the mechanical department shops of the Twin City Rapid Transit Company, has been found to make a very handy ma-



An Old Brake Cylinder Mounted on an Arbor Press Makes a Very Handy Machine Tool in the Shops of the Twin City Rapid Transit Company





At Left—The Armature Clamp Is Hinged at One Side and Is Pulled Down Tight by Means of a Large Wing Nut. At Right—With the Armature Held Securely in the Clamp, One Man Easily Loosens the Nut or Removes Pinions Without Any Assistance

chine tool for a number of common electric railway shop uses.

This outfit is mounted on the end of the bed of a large lathe in the machine shop, where it is convenient for use on many of the jobs going through this department. The air cylinder is pivoted at the rear of the machine, and the power is transmitted to the spindle by means of an overhead lever. A large nut on the threaded upper portion of the spindle forms a stop and limits its travel to any predetermined amount.

For many drifting operations, such as that of drifting the holes in copper rail bonds, for pressing in and out brake-rigging bushings, and for other similar work, this simple home-made outfit has been found extremely useful and efficient.

## Wood Clamp for Holding Armatures

WHEN it is necessary to loosen the pinion nut for removing the pinion on an armature, a split block is used in the shops of the Kansas City Railways to hold the armature securely, so as to insure against any damage from rubbing or other cause while the nut is being taken off. This is a very simple rig, but it avoids possible damage to armatures.

The block is shown in the accompanying illustrations, both in open and closed positions. It clamps down on the laminations, holds the armature securely, and does not damage the coils. By holding the armature in this way one man changes pinions without any assistance.

As shown in the illustration, the block is made up of heavy timbers formed for holding the armature between the two halves. For smaller armatures, a filler block is inserted to give the desired clamping effect.

## Automatic Lamp Control Saves Power*

IN SPARSELY settled territory along the route of the San Francisco-Sacramento Railroad there are numerous small shelter stations in the vicinity of which the company has no agent. In order that these stations should be adequately lighted when passengers are boarding or alighting from trains, it was customary to keep the lamps burning continuously. Recently, however, the railway has connected these station lamps to the block signal system in such a way that they are lighted only when the train is within 3 miles of the station coming or going. This has saved a considerable amount of power during the night when there are few trains on the line, and has also had a tendency to prolong the life of lamps. Similarly, the block signals themselves have been arranged so that they are now lighted only one block ahead of the approaching train.

*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.



On the San Francisco-Sacramento Railroad Signals of This Type Are Lighted Only in the Block Immediately Ahead of an Approaching Train

## Testing Contactor Mechanisms

A CONVENIENT method of testing various parts of control contactor mechanisms has been worked out in the Wheaton shop of the Chicago, Aurora & Elgin Railroad with the result that irregularities in the contactor operation are discovered and remedied before the mechanism is placed in service. The apparatus consists of a rack from which hang the three types of stationary contactor parts used by this property, including the magnet coil, arc chute, and framework for receiving the movable mechanism. The magnet coils are hooked up in parallel and are connected to a 220-volt d.c. line from the shop switchboard. By means of a switch located on a board back of the test rack,

any one of the magnet coils may be put in service.

The mechanism to be tested is attached to the stationary coil in much the same manner as it would be under a car. By making and breaking the connection to the magnet coil, it is possible to "pick up" or "drop out" the contactor armature upon which is mounted the contactor tip. In case of failure to operate the necessary adjustments or repairs are made to the movable mechanism.

The supporting bracket is made of 1-in. x 1¼-in. steel held in position by a light framework at each end. Each stationary mechanism is labeled with the type of control system to which it belongs, thus facilitating the work of testing.

# New Equipment Available

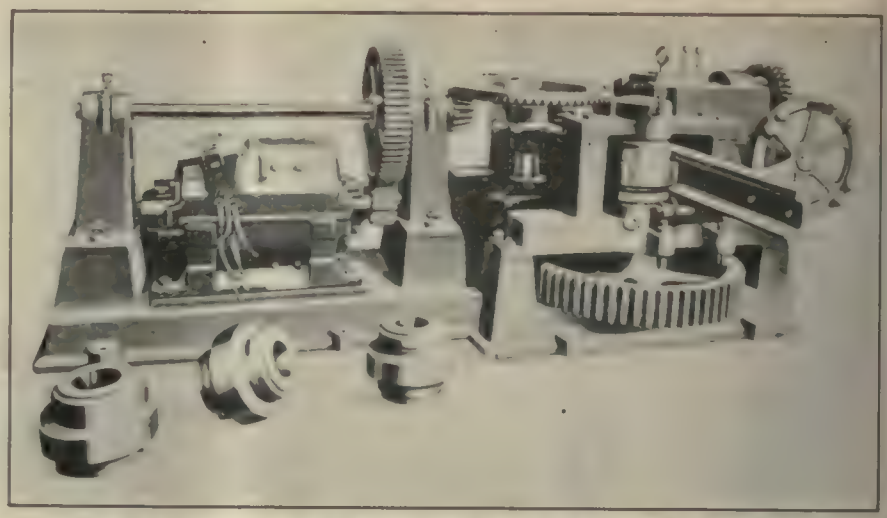
## Improved Power Rail Bender

AN IMPROVEMENT to its former type of power-driven rail bender has recently been put on the market by the Watson-Stillman Company, New York. This improved type apparatus will not only bend rails to any desired radius but it can be used also to straighten curved rails.

In operation three rolls fitting the section of rail are used. Two gear-driven feed rolls are spaced 32 in. apart center to center. The third or center roll is forced against the rail by two large screws operated by hand wheels, the position of this roll determining the curvature. The rails are passed back and forth between the rolls by using a reversible motor. In case the machine is belt driven the motion is controlled by a belt shifter with tight and loose pulley.

The frame of the machine is of open-hearth steel with cast-iron bedplate. Gears have cut teeth and are made of either cast iron or steel as desired. Rolls are cast steel. The roll shaft and gear shaft are of machinery steel.

Rails are passed through the machine at a speed of about 50 ft. per minute. T-rails require one set of three rolls. Guard or girder rails require one set of six rolls for each rail section. All rolls can be changed easily by removing the frame cap and one gear. Guards are furnished with the machine to conform to safety laws. The machine is built in two sizes, 75 tons and 100 tons. The larger size has sufficient power to curve or straighten any rail section now in use.



This Power-Driven Rail Bender Will Curve or Straighten Any Rail

## Friction-Head Screw Driver

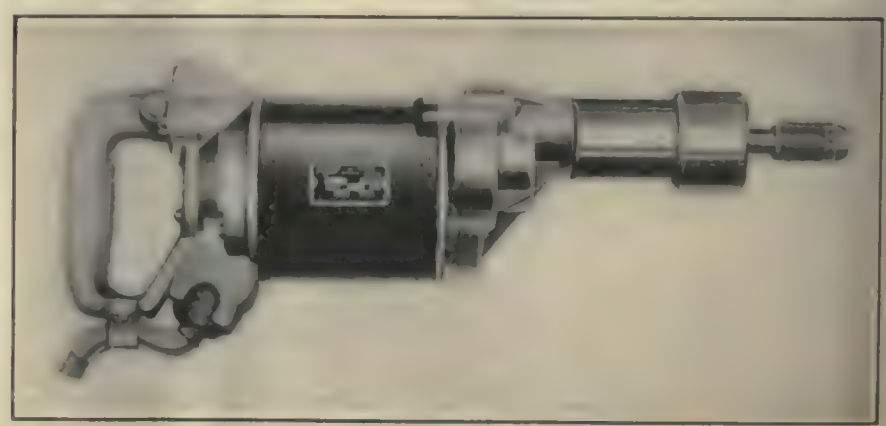
AN IMPROVED electric screw driver is being offered to the trade by the Hisey-Wolf Machine Company, Cincinnati, Ohio. New features in the design include a disk-type friction clutch, which is automatically adjusted according to the pressure applied by the operator. The clutch casing is of convenient size and serves as a grip when the work requires. The device is equipped with ball bearings throughout and is provided with a universal motor for operation either on direct or alternating current.

This machine can also be used for setting up nuts, and standard nut sockets can be furnished in sizes of ¾ in., ⅞ in., and 1 in. for either square or hexagonal nuts. These are recessed for bolt clearance to a depth equal to twice the bolt diameter.

## Light-Weight Insulating Board

TO MEET the demand for a light-weight low-cost insulating board with high dielectric strength, the Panelyte Company, Trenton, N. J., is placing on the market a new insulating material weighing only 74 lb. per cu.ft. This material is compounded of several well-known dielectric substances produced by nature, including cellulose fibers. It is not brittle and is easily drilled, tapped, sawed and polished. Panelyte has a black polished surface, which it is said is not affected by acids or oils. Sandpapering and rubbing with oil will produce a dull surface.

When ignited this material burns slowly. If left alone, the burning dies down and finally goes out without consuming the panel. It is claimed that the destructive effect of the burning does not penetrate all the way through the panel. Among the uses for which Panelyte is suited are controller backboard panels for switchboards, fuse blocks, exciters, converter panels, busbar supports and back-connected switches.



Electric Screw Driver with Friction Head

# The News of the Industry

## Compromise in Cincinnati

### In New Traction Franchise Railways Make Concessions to City to Further Early Settlement

Surrender by the Cincinnati Traction Company and the Cincinnati Street Railway on six disputed proposals and compromise on two others, the compromise being in favor of the city of Cincinnati, is contained in the latest draft of a new traction franchise which will be submitted soon to the Mayor's citizen traction committee. Some of the conclusions of the conferees follow:

The Avondale and Bond Hill cars will continue to run to Fourth and Main, instead of only to Sixth and Main, as desired by the company.

The company agrees to pay half the expense of the upkeep of the city street car director's office, its share not to exceed $15,000 annually.

The company agrees to pay rental for viaducts, instead of only share expense of track and overhead maintenance.

The company agrees to eliminate the wage proviso in the 7½-cent fare guarantee for the initial three years.

The company agrees not to increase fares on owl cars.

The company relinquishes the proposal that on purchase of the properties by the city there shall be a 10 per cent premium on stock.

A compromise was effected in the matter of court costs and extension of the "rehabilitation" period so that it goes to Dec. 31, 1928.

The printed draft of the ordinance will contain the proposal that the company shall pay not to exceed $25,000 in any one year for street paving. But an alternative proposal is that the company shall share half of the expense of paving only on streets improved during or since 1920.

It was made plain by Walter A. Draper for the two companies and by City Solicitor Saul Zielonka that the changes and modifications were tentative and contingent. The companies make their concessions only on the consideration that the city accepts one or the other of the alternative paving proposals.

## Rapid Transit Agitation Renewed in St. Louis

Mayor Henry W. Kiel is expected to be a candidate for re-election to a fourth four-year term on the rapid transit issue next spring so the administration is expected to speed through the preliminary survey. C. E. Smith, consulting city engineer, has very decided views on the city's rapid transit needs. He favors a system of subways downtown with feeder elevated lines reaching into the outlying sections of the city and its suburbs.

The special transportation committee in its report to the Board of Public Service recommended that a system of zone fares be worked out so that those outside the city who will benefit by rapid transit will have to pay part of the cost of building and maintaining the system.

The committee has recently repeated its former declaration that the cost of building a rapid transit system should not be laid at the doors of the car riders alone, but that private property which benefits should be assessed part of the costs as is done at the present time in street widening and paving projects.

The proposed rapid transit system for St. Louis would cost upward of $100,000,000. The city under a recently enacted state statute has ample authority to vote bonds for that purpose.

## New Franchise Agreement Approved at Akron

### Franchise Submitted to Direct Vote of Car Riders—Four Years of Operation Under New Fare and Other Conditions Proposed—Municipal Bus Plan Defeated

BY A VOTE of 28,682 to 24,872 the residents of Akron voluntarily took the traction issue out of politics Tuesday and gave to the Northern Ohio Traction & Light Company a new franchise for four years at a 7-cent cash fare, four tickets for 25 cents, or 17 tickets for a dollar. The new rate is to go into effect immediately. Express bus service is provided at a 10-cent fare. The company is given the right to use one-man safety cars, but they must be of double-truck design. No new railway extensions are provided, but the city has the right to order additional bus service amounting to the operation of 500,000 miles annually.

City officials, who by their refusal to grant the company an increased fare last February caused Akron to be without car service for four weeks, tacitly approved the agreement by keeping silent about it. They took no position for or against it officially, but by declining to oppose the agreement made it clear that they were not against it. In other words, the city administration maintained a "hands off" policy as did both of the leading political parties and one of the newspapers. One newspaper advised the people to vote against the franchise and another condemned the proposal and at the same time denounced the administration for failure to take a stand on the issue. Only one publication, a woman's magazine, bitterly opposed the franchise.

The franchise was submitted by the company through initiative petitions. More than 11,000 persons signed these petitions, although only 3,850 signatures were needed.

The company conducted its own campaign and appealed to the fairness of the public. Early in the campaign the company made its plea to the car riders and it may be said that it was the car and bus riders who voted for the proposal. The measure was opposed by independent bus operators, former jitney operators and by an organization known as the Car Riders' League. In its campaign the company paid no attention to attacks made upon it. All of the work done was carefully mapped out in advance and in no way did the company deviate from the course laid down. Election day was fair and a very heavy vote was polled.

The new franchise takes the place of the temporary contract made Feb. 27, following a period of 27 days when the city attempted its famous motorization scheme. The old 25-year franchise expired on Feb. 1 and the city attempted to compel the company to continue operation for a period of three or six months at the old 5-cent rate of fare, the voters more than two years ago having granted the company that rate, the old rate being on a 4-cent ticket basis. When the settlement came in February, a temporary agreement was made until Dec. 4 at a rate of 5 cents cash with a 1-cent transfer charge. If no new contract had been adopted at the general election, the temporary proposal provided a 6-cent cash fare from Dec. 4 until May 1, 1925, at which time the company was to discontinue operations, under order of the Council.

One feature of the new franchise which was assailed was the company's right to abandon car lines and substitute buses on streets to be paved or repaved. The company took the position that it could not reasonably be expected to make heavy capital expenditures under a 4-year contract. Another feature which met opposition was the provision eliminating competition on routes where the company now operates.

The city administration submitted a bus bond proposal at the same election. This proposal provided for the issuance of $3,000,000 of bonds for the purpose of establishing a municipal bus system in the city. The measure was defeated by more than 9,000 majority. Several other bond issues submitted at the same time were defeated with one exception.

## Chicago Elevated Answers Mayor's Strictures

An answer to Mayor William E. Dever's recent implications that the Chicago Rapid Transit Company (elevated railroads) would be unable to procure money to build a subway if granted permission by the City Council was embodied in a page advertisement taken by the company in the seven Chicago dailies.

The ad was headed "A Record In Railroad Building." It outlined the construction records being made on the Niles Center extension of the rapid transit lines, pointing out that the work is already two-thirds completed and that the line will be in operation by Feb. 1, 1925.

Permission was granted on April 3, 1924, by the city of Evanston, in the limits of which the railroad is being constructed, it being the first suburb directly north of Chicago. Therefore the railroad construction work will have consumed only ten months time.

In the center of the advertisement an editorial was reproduced which had been published in the Chicago *Tribune*, leading morning paper, berating the city's lassitude in subway matters. The editorial was headed "Laugh, Darn You, Laugh." It is considered a very good one from the point of the railroad. Part of it follows:

> The elevated rattles around in downtown Chicago, depreciating property values, an offense to the eye, and an outrage to the ear. It is the only approach to rapid transit we have, and no doubt as good as is can be made with the limitations placed upon it.
>
> When Mr Insull begins to build outside the Chicago limits he deals with a municipal corporation which belongs in the year 1924. He is allowed to come down off stilts and get underground. He must wait until he escapes from Chicago before he is allowed to consider the general good of the community, the values of adjacent property, the possibility of giving real rapid transit to his passengers, or any of the requirements of modern metropolitan transportation.
>
> Let's try and laugh this off. Evanston has a subway. The Chicago elevated is in it.
>
> Will Evanston take us in? Or should we apply at Dunning?

Incidentally, it should be mentioned that Dunning is the site of the Insane Asylum for Cook County, in which Chicago is located.

The advertisement was illustrated with six pictures of recent steps in the construction of the extension, and the text described several of the difficult engineering problems which were encountered in the construction work. In speaking for the company Luke Grant said:

> It is the policy of the company to answer any statements of politicans regarding our affairs, whenever possible. In this case we attempted to show that we have already proved our ability to accomplish construction, similar, in a way, to that proposed in Samuel Insull's plan for a subway in Chicago.

## Trackless Trolley Installed in Cohoes

A test was made by the United Traction Company, Albany, N. Y., on Nov. 1 of the trackless trolley installed by that company in the city of Cohoes. The installation was made by the Capitol District Transportation Company, a subsidiary of the United Traction Company. The plans of the company called for the use of four vehicles at the outset. The route over which the new equipment will be run is known as the Belt Line. The period of the franchise applying to the trackless trolley route is four years. It is stipulated that fares on the trackless lines are not to exceed the rate charged on the other lines of the company. Among the manufacturing companies that contributed to the installation were the Brockway Corporation, the General Electric Company and the Wason Manufacturing Company.

## Will Await Decision on Interstate Bus Companies

Decision as to the right of interstate bus companies to operate in Massachusetts without a license from local authorities, which has been asked of the Attorney-General of that state from a score of towns and cities, will depend largely on the decision in the case of Buck vs. Kuykendall, which is due to be argued before the United States Supreme Court on Nov. 10. Attorney-General Benton of Massachusetts says he considers the transportation issue on this point so vital that he will withhold his decision pending developments in the Supreme Court case and will go to Washington to hear it argued.

The Massachusetts Department of Public Utilities has also decided to enter this case and will be represented in a brief to be filed by John E. Benton, general solicitor of the National Association of Railroad and Utility Commissioners. The national association, which is composed of the state commissions, will take the attitude in this case that until Congress acts in the matter the various states may exercise regulatory power over bus lines operating over highways including those operating interstate, and that such regulation incidentally affects and does not unduly burden interstate commerce.

Chairman Henry C. Attwill of the Massachusetts commission says in his instructions to the general solicitor of the national association that every effort should be made to sustain the proposition that the state have jurisdiction to regulate motor vehicles running from one state into another state.

The case now before the United States Supreme Court grew out of the petition of a bus line for a license to operate a bus between the state of Washington and points outside the state. The Department of Public Works of Washington denied the petition on the ground that there was a bus line already in existence operating under a previous permit. Mr. Buck appealed that case to the federal court seeking to enjoin the state officials from interfering with the operation of his proposed line. The lower court denied the injunction and ordered the bill in equity dismissed, whereupon Mr. Buck appealed to the Supreme Court of the United States on the point that interference by state authorities with interstate commerce is in contravention of the commerce clause of the federal constitution.

Whatever the decision by the Supreme Court, it will affect all state commissions, and if the issues are similar to the issues which have been raised in Massachusetts regarding the bus lines that operate from various Massachusetts cities to Providence, R. I., it will determine the course for those cases.

At present the lines in Massachusetts maintain they can operate from state to state without any license from local authorities.

## Increased Service in Indiana

A complete change in schedules, providing for more fast through cars between Fort Wayne and Indianapolis, about 120 miles, will go into effect shortly on the Indiana Service Corporation and Union Traction of Indiana lines, according to an announcement of local officials of the corporation. The main feature of the schedule change will be the establishment of six new fast trains to be known as the Hoosierlands and Wabash Valley Fliers. These cars will make the entire distance of the trip in four hours. These cars will augment the existing schedule, which calls for the operation of two fliers on each division daily. An equal number of fast trains will be started from the Indianapolis end of the system, providing fast through service at practically all hours of the day. Other changes will be made in the schedule to make possible better traction connections to all parts of the Middle West.

## Ten Killed in Chicago Grade Crossing Accident

Ten passengers were killed an two score injured, some seriously, early on Nov. 2 when a Chicago, Milwaukee & St. Paul Railroad freight train, backing into the yards, wrecked an electric street car crossing the tracks. Most of the victims were neighbors returning from a Hallowe'en party.

## Contracts for Use of Indianapolis Terminal Facilities Hold

The petitions filed by the Cincinnati, Indianapolis & Western Railroad against the Indianapolis Union Railway asking that the plaintiff's contracts be rescinded with the Indianapolis company for use of its terminal facilities at Indianapolis were dismissed for lack of equity in an opinion given by Judge Hickenlooper in United States District Court at Cincinnati. In his opinion Judge Hickenlooper said that for two years after entering into the contract the plaintiff paid rentals under the contract. He held that, while the law provided relief for a mistake of law or fact, proceedings to rescind must be begun immediately.

The petitions were originally filed in the foreclosure suits of the Central Trust Company and Equitable Trust Company, New York, as trustees under mortgages against the Cincinnati, Indianapolis & Western Railroad, and sought to have rescinded contracts for use of terminal facilities. The railroad was to pay two-thirteenths of the fixed rental for its use of the terminal. The plaintiff alleged that when it purchased the property of the Cincinnati, Indianapolis & Western Railroad in 1914 it agreed to only one contract regarding the use of the terminal.

## Buses Supplant Maumee Valley Line

The Maumee Valley Railway, Perrysburg, Ohio, ceased operating cars at midnight on Nov. 1, and early the next morning the Maumee Valley Transportation Company, a subsidiary of the railway, put a fleet of seven Fageol coaches in operation over the former traction route. Five of the coaches are equipped with wicker chairs and two are of the street-car type for use at rush hours. The interurban station at Toledo is used.

The company has not yet received permission to operate on the west side of the Maumee River between Toledo and Maumee, but it is expected that the State Public Utilities Commission will authorize the company to use the old belt line as territory for the new bus line.

Rails, poles and other equipment of the railway will be removed and sold. The railway operated seven passenger cars over 23 miles of line.

## North Shore Transports Students to Automobile Plant

The Chicago, North Shore & Milwaukee Railroad recently carried 140 students of Lane Technical High School, Chicago, to Kenosha, Wis., for a trip through the Nash Automobile Company plant. Britton I. Budd, president of the North Shore Line, in order to increase the interest of the high school students in their trip, offered a gold watch as a prize for the best descriptive essay on the trip. The boys were picked up by a North Shore train at a station directly adjacent to their school and professors in charge of the tour were high in their praise of the service rendered by the company. At the Nash plant a short talk had been arranged for the high school students by the city manager of Kenosha.

## Boston & Maine Will Study Truck and Bus Transportation

The Boston & Maine Railroad, Boston, Mass., has announced the establishment of a department to study the subject of motor truck and bus transportation. Special attention will be given to the study of motor transportation, both passenger and freight, as related to the Boston & Maine traffic by Howard F. Fritch, formerly assistant general manager of the Eastern Massachusetts Street Railway. Frank I. Hardy will represent Homer Loring, chairman of the executive committee, in various investigations. Mr. Hardy was formerly manager of the Chelsea division of the Eastern Massachusetts. Both these newly appointed assistants to Mr. Loring were referred to in the ELECTRIC RAILWAY JOURNAL of Oct. 25.

According to the statement from President Hustis of the Boston & Maine, the work to be undertaken is of great significance. The inroads of motor competition in Boston & Maine territory have been constantly growing. The result of the question in some sections is whether the railroad or motor truck can best serve the territory. He believes it is apparent that in certain fields both agencies cannot be continued and that either one or the other must prevail. He said further that the problem was not necessarily one of competition, but involved the elimination of expensive duplication and the adjustment of both forms of transportation to a logical and permanent basis.

## Stunned by Injustice, Boise Railway Is Ready to Quit

Discontinuance of city service by the Boise Valley Traction Company is considered probable, should the City Council grant a 10-cent bus franchise. W. R. Putnam, vice-president of the railway, has written to Mayor Sherman pointing out the injustice of the proposal. He says in part:

> The owners of these properties could have no other conclusion when a 10-cent bus franchise is granted than that street car service, at a cost considerably less than bus service, is not desired, and therefore would be warranted in taking steps to discontinue city street car service.
>
> At present 90 per cent of the fares paid for city service are 5 cents, and the average fare paid by all city riders is less than 5¼ cents. We have been quite interested in the situation that has developed, namely, that some of the very people who have objected to our receiving an average fare in excess of 5¼ cents are now advocating a 10-cent fare for other types of transportation. This is of particular significance when one considers that the installation of buses in the city presumably means that street cars in Boise are considered a thing of the past and their operation will be shortly abandoned.

## Station Plans Announced for North Shore Line

Developments announced recently on the Niles Center extension of the Chicago, North Shore & Milwaukee Railroad, over which trains of the Chicago Rapid Transit Company will be operated for a distance of 5¼ miles, are the announcement of the plans for the stations and the laying of the first sections of permanent track.

The stations are of three types, directly above the tracks where the road is in the open cut; below the tracks where the road is elevated; between the tracks on the surface. There will be a large terminal station.

Granite terra cotta, steel, concrete, art marble and tapestry brick are among the materials to be used in the construction. Beauty of design is embodied in the station plans, in order that they may harmonize with the suburban surroundings of the territory served.

Engineers in charge of construction maintain that they will have trains running early in January, 1925, their original schedule. If they do it will constitute a record in railroad construction. Details of some of the construction problems were outlined recently in the ELECTRIC RAILWAY JOURNAL.

## New Agreement in Fostoria

A wage and working agreement was recently reached between the union and the Toledo, Fostoria & Findlay Railway, Fostoria, Ohio, after several conferences at which were present Elmer Smith, general manager of the line, and H. Lee Camp, business representative of the union, and a committee representing the employees. Under the agreement conductors and motormen on passenger cars are to receive 47 cents an hour for the first year in service, 49 cents an hour for the second year, and 52 cents an hour thereafter. Freight car crews are to receive 2 cents an hour above that schedule in the three classifications. No run is to pay for less than the 10-hour minimum day. No change was made in the wages of shopmen, but improved working conditions were provided.

The Toledo, Fostoria & Findlay is about to take over the Fostoria & Findlay line. In the event of the consolidation the new agreement is to cover the men on that line. The contract is operative from Oct. 1, 1924, to Oct. 1, 1925. There is a plan for an agreement between the various interurban lines in that section of the state to establish through service between principal points on the various lines. In that event the new agreement provides that the men on the Toledo, Findlay & Fostoria line are to get 50 per cent of operations north of Findlay.

## Change in Boston Fare Made Nov. 5

The 6-cent fare did not go into effect on the Boston Elevated System on Nov. 1 as first planned. Owing to the amount of detail involved in preparing for the change, the increase from 5 to 6 cents was withheld until Nov. 5. On the bus lines the introduction of the 6-cent fare will be gradual, as the buses come under the jurisdiction of the city and town authorities, by whom they were licensed to operate at a stipulated fare unit.

## Indiana Company Will Transport Coal

Transportation of coal by traction will be inaugurated for the first time in Indiana during the coming year, if plans now being formulated by officials of the Interstate Public Service Company, Indianapolis, Ind., materialize. It is the plan of the company to begin transportation of coal from the Ohio river landings to Indianapolis in large volume early next year. This, it is understood, will mean a substantial reduction in transportation costs between the coal fields of West Virginia and western Pennsylvania and Indianapolis, part of which may be reflected in lower fuel prices to the consumer.

In order to enter this field the Interstate, Bert Weedon, traffic manager of the company, said, would purchase 100 new gondola coal cars and make necessary improvements at the Ohio River, such as running of switches along the riverfront and installing loading equipment at the docks, all of which may entail an expenditure for equipment and trackage of approximately $300,000.

**Little Rock's Service Better.** — In accordance with the recommendations made by Ross W. Harris, traffic expert, recently employed by the city of Little Rock, the Arkansas Central Power Company has made changes in its tracks and lines which are helping to solve Little Rock's traffic problems and giving better service to the patrons.

## Bureau Opposed to Jitney Competition

The Board of Commissioners of Charlotte, N. C., recently passed an ordinance requiring definite routes and schedules to be maintained by buses and the posting of indemnity bonds of $5,000 each. This action was taken for the "sake of the safety of the public." The commissioners reserve to themselves the power to revoke the license wholly or in part whenever in their estimation the buses as operated are unduly interfering with the use of the streets by the public or traffic rules and regulations are violated or when the schedules as outlined are not followed. The North and South Carolina Public Utility Information Bureau has recently expressed some concern over the jitney competition which seems to be prevalent throughout the states of North Carolina and South Carolina. It feels that Charlotte in regulating her buses has taken a step which should be followed by other larger municipalities in the state. It calls attention to the fact that in Asheville, N. C., the unregulated jitney is jeopardizing the street railway, with the public indifferent enough to deny protection to the company's franchise.

## New Tariff Increases Rates

The Syracuse & Eastern Railroad, operating lines to Fayetteville and Manlius from Syracuse, N. Y., has been granted permission by the Public Service Commission to increase its cash rates from 3 to 3½ cents a mile and for ticket fares from 2 to 3 cents a mile, with an increase in 50-trip commutation tickets from 1½ cents to 2 cents a mile. The minimum cash fare will be 7 cents and the minimum ticket fare 9 cents. The new tariff became effective on Oct. 20. Harvey D. Gross, general manager of the company, explained that the increase was sought because he was convinced that the public would not ride in cars in any greater numbers solely because of lower fares. He said that the fare was decreased in 1921 to 6 cents, with the view that people would give greater patronage; that the rates had not been changed since then, but that the extra number of passengers had not increased materially. The company operated at a loss in 1923 and the profits this year so far have been small. The company is making an effort to induce commuters to use the line. These will benefit by a rate of 2 cents a mile, with the 50-trip ticket selling for $4 instead of $3.

## Orders Service Continued

Modifying a previous order, the New Jersey Board of Public Utility Commissioners has directed that trolley service be continued by the Trenton & Mercer County Traction Corporation to the northern limit of Pennington. Early in August the board granted permission for the abandonment of service at a point near the center of the town. Pennington residents objected to half of the town being without trolley service.

Substitution of buses for cars on the Hopewell branch of the Trenton & Mercer County Traction Company between Pennington and Hopewell was authorized some time ago by the Board of Public Utility Commissioners of New Jersey. The commission pointed out that the trolley line showed an operative deficit of more than $7,000 for the last year. Testimony was offered that the county purposes to pave the streets in Pennington and Hopewell over which the tracks run, insisting upon the installation of modern tracks, the estimated cost of which would have been more than $50,000.

## News Notes

**Invites Criticism.**—Seeking better to serve the patrons on the various bus lines, S. S. Crane, general manager of the Logan Valley Bus Company, a subsidiary of the Altoona & Logan Valley Electric Railway, Altoona, Pa., is distributing questionnaires to the patrons urging them to make constructive suggestions.

**Electric Railway Planned.**—It is reported that plans for the construction of a $2,500,000 electric railway between Manitowoc and Sturgeon Bay have been announced by C. D. Smith of Fond du Lac, president of the Wisconsin Southern Railway, and C. V. Sheldon, chief engineer. The contract for the project is reported to have been awarded to the Ed Shuster Construction Company.

**Authorizes Fare Increase.** — The Maine Public Utilities Commission on Nov. 1 rendered its decision on the application of the Bangor Railway & Electric Company, Bangor, Me., for permission to increase its fares on all lines from 7 to 10 cents. A protest against the increase was made on behalf of the University of Maine students, many of whom live in Bangor.

**Bus Line Asked.**—The Los Angeles Railway, Los Angeles, Cal., has filed an application with the State Railroad Commission for permission to run a bus line from San Pedro Street and Florence Avenue to Florence and Pacific Boulevard. The north half of Florence Avenue is in the city of Huntington Park. The city trustees of Huntington Park have been notified of the proposed new service.

**Changes Made in Fare.**—The Public Service Commission has approved the fifty-four-trip monthly commutation ticket fare of $25 on the Olean, Bradford & Salamanca Railway between Olean and Salamanca. The fifty-four-trip commutation ticket fare of $24.50 between Olean and Killbuck was canceled. The changes are effective Nov. 28.

**Wants Suggestions on Operations.**—C. D. Smith, general manager Beaver Valley Traction Company, New Brighton, Pa., has sent out a circular to all employees soliciting suggestions relative to the operation of the road. Employees of the Beaver Valley Traction Company and the Pittsburgh & Beaver Street Railway are included in the program, whereby suggestions are to be submitted to William A. Coyle, chairman of the committee on suggestions, subsequently to be considered for prizes, which are offered every three months. The prizes vary from $1 to $75. The suggestions can apply to any part of the property of the Philadelphia Company and affiliated corporations, including the Pittsburgh Railways.

**P. R. T. Carriers Successful.**—The demand for the P. R. T. carfare carriers has far exceeded the supply, 65,000 having been sold from Oct. 30 to Nov. 2. The company is making every effort to renew its supply in sufficient quantity to meet the need. On Nov. 10 distribution of carriers on the cars will be resumed. These token carriers were referred to in the ELECTRIC RAILWAY JOURNAL, issue of Nov. 1.

**Plans Faster Interurban Service.**—In its plan to cut from 20 to 30 minutes from the running time of its present interurban service out of Milwaukee to Watertown, East Troy, Burlington and intermediate points, the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has purchased land for rights-of-way in the towns of Lake and Wauwatosa, thus avoiding the longer route now used through West Allis. A cut-off is under contemplation to speed up the Racine and Kenosha service.

**Minimum Fare of Ten Cents.**—The Gardner & Templeton Street Railway, Gardner, Mass., has abolished the 5-cent zone fare collection system and put into effect a minimum fare of 10 cents. The new fare affects the employees of an industry in Templeton and another in East Templeton and residents between Johnson's Switch and West Gardner Square on Parker Street, who have been riding for 5 cents.

**Abandonment Hearing Deferred.**—A hearing will be held on Nov. 15 before the California Railroad Commission, when the towns of Chula Vista and National City will present their reasons for their opposition to the application of the San Diego Electric Railway for permission to discontinue railway and bus service between National City and Chula Vista. The railway is seeking to abandon service because operation in these parts is a losing proposition. Until a final ruling is made railway and bus service will be continued by the company. The commission heard evidence submitted by the company on Sept. 12 to show that the car and coach services failed to meet expenses.

**Jitneys Again in El Paso.**—Jitney competition has aroused public ire in El Paso, Tex. The El Paso *Herald*, under recent date, stated its desire to hear from readers the reasons why jitneys should be allowed to operate again in the city of El Paso. The item compared jitney operation with railway operation, with the argument strongly in favor of relegating the jitneys off the streets of the city, and concluded by saying that Mayor Dudley would have the backing of all the people if he would take the necessary steps to break up the jitney competition "that is just now beginning to become a real menace." Jitneys ceased operating in El Paso on April 30, 1923, following the enactment of an ordinance. An-

other Texas city where jitneys have been ruled out is Fort Worth. The Supreme Court of Texas at Austin handed down a decision on Jan. 24, 1924, declaring valid the city ordinance prohibiting the operation of jitneys within the Fort Worth limits. The jitney operators had previously secured a temporary injunction against the enforcement of the terms of the ordinance.

**Greater Use of Bus Recommended at Toronto.**—After a survey of the transportation system in Toronto H. S. F. Langsdown, traffic superintendent of the London General Omnibus Company, has stated that the city is ready for omnibus service paralleling the electric railway lines in the downtown districts. Mr. Langsdown said that instead of taking traffic from the trolleys, the new mode of transportation would encourage motorists to leave their cars at home and ride downtown in a bus. He suggested that the buses be used in the surrounding country on Sundays and holidays. The railway in Toronto is municipally owned and operated.

**Safety of Operation to Be Discussed.**—Charles Hansel of New York city, consulting engineer of the Pennsylvania Railroad, the Philadelphia & Reading system, the Central Railroad of New Jersey and a member of the presidents' conference committee representing all the rail lines of the country, is in Buffalo, at the invitation of Herbert G. Tulley, president of the International Railway, for consultation in matters affecting the operation of the local and interurban lines. The purpose is to determine if it is desirable to rearrange any conditions respecting the safety of operations. Mr. Hansel is thoroughly familiar with the properties of the International Railway and, at the request of President Tulley, he made a report in July, 1923, suggesting some minor changes, all of which were promptly made by the International Railway. Special attention will be given to the Buffalo-Niagara Falls high-speed line division of the International since the Oct. 19 wreck at Ellicott Creek crossing.

**Supplement for Business Purposes.**—"Current Topics" will hereafter carry a supplement with reliable and specific information to the employees and officials of the Illinois Power & Light Corporation and its allied companies as to the products of the industries in the various cities served by them. By this move it is hoped to "turn business to the industries in our territory." In the November issue a Topeka supplement is published, telling in detail of this pioneer city of Kansas.

**Wants to Extend One-Man Service.**—The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has applied to the Railroad Commission for authority to extend its one-man car service to its Walnut Street line, which passes through the downtown section of the city into the northwest section of the city. The company is now operating one-man cars on three other lines in the city.

**Allowed to Operate Ten Buses.**—Five decisions granting permission to the Central Transportation Company, a subsidiary of the Trenton & Mercer County Traction Corporation, Trenton, N. J., to operate ten buses in Trenton have been handed down by the Board of Public Utility Commissioners of New Jersey. These buses are already being operated under city ordinances, but since they parallel the same streets with trolley tracks approval had to be given by the state body. The company has also been authorized to operate a bus between Trenton and Allentown.

**Appleton-Sheboygan Bus Service Started.** — The Wisconsin Traction, Light, Heat & Power Company has commenced the operation of its Appleton-Sheboygan bus service. Connections will be made at Sheboygan with the trains of the Milwaukee Northern Railway, an electric railway operating on an hourly schedule to Milwaukee.

**Rerouting Plan Proposed.**—A comprehensive plan for the rerouting of the car lines of the United Railways & Electric Company serving northwest Baltimore has been prepared by the transportation bureau of the Public Service Commission and sent to the United Railways for study. The plan was prepared by Ben Haughey of the commission staff.

**Opposes Bus Line.** — The Cincinnati Traction Company, Cincinnati, Ohio, has filed a protest with the Ohio State Public Utilities Commission against the application of Walter King and William McDaniels for authority to operate a bus line between Lebanon and Cincinnati. The traction company asserts that service between the two places is already adequate.

**Will Run One-Man Cars.** — General Manager D. W. Harvey of the Toronto Transportation Commission, Toronto, Ont., has stated that one-man cars will be operated on a 10-minute schedule on the York Township car lines. He also confirmed the previous announcement that tickets would be sold on the township cars at the rate of 11 for 50 cents.

**Buses to Continue Operating.**—The City Council of Oskaloosa, Iowa, granted another 90 days to the Oskaloosa Traction & Light Company for operating buses instead of street cars over certain sections of the city. The trial period for bus operation was referred to in the ELECTRIC RAILWAY JOURNAL, issue of Aug. 2.

**Will Soon Operate One-Man Cars.**—One-man cars will be placed in service on the Clinton division of the Clinton, Davenport & Muscatine Railway, Davenport, Iowa. The bodies of the cars were made in the Rock Island shops.

**Bus Service Extended.** — Extension of the River-Bayside Street bus service to Thirty-fourth and Kromer Streets, in Everett, Wash., as an experimental service will be started immediately by the Puget Sound International Railway & Power Company, under the direction of C. C. Coates. The extension is the second since the first of the year and is another step the company announces, in its desire to cover the city with transportation as fully as possible. Continuance of the service is contingent upon support by the public and safety of operation. The need of some sort of service to this district has long been outstanding. The buses will furnish 18-minute service.

**Awaiting Wage Decision.**—Trainmen of the Middlesex & Boston Street Railway, Newtonville, Mass., are awaiting a decision in the recent arbitration proceedings. The 350 carmen are demanding 70 cents an hour for a working day of 8 hours, the present scale being 55 cents an hour for a working day of 9 hours. Early in the present year the men were granted an increase of 4 cents an hour, the award being retroactive to July 1, 1923, and to continue in force until June 30 of the current year.

**Railway Wants Relief.**—The Chickasha, Okla., City Council is attempting to find ways and means to co-operate in securing continued car service for Chickasha. A letter from C. F. Woodworth of Wakefield, Mass., treasurer and general manager of the Chickasha Street Railway, advised the Council that the company was operating at a loss and would be compelled to discontinue service unless substantial relief measures could be adopted. An 8-cent fare, a substantial reduction in taxes and a lower power rate for electricity are suggested as three needed measures of relief. The City Council is believed to be anxious to co-operate and has asked the Chickasha Gas & Electric Company to consider the possibility of reduced power rate. It is stated that the road has paid no bond interest this year and has had a net loss from operation.

**St. Louis Survey Planned.**—The survey of rapid transit engineering and financial methods to be made under the direction of President E. R. Kinsey of the St. Louis Board of Public Service will require probably nine months' time. C. E. Smith, consulting engineer for the city, will do most of the work and will be assisted by men from his own office and certain members of Mr. Kinsey's staff. Compilation of data as to plans followed in other cities will come first. It will also be necessary to make a survey to ascertain what sewer, water, cable and gas lines will be affected by the proposed subways.

**Wages Increased Two Cents.**—An increase of 2 cents an hour in the pay of employees of the Rochester, Lockport & Buffalo Railway, Buffalo, N. Y., was granted on Oct. 30 following a lengthy conference between James Largay, vice-president of the street railway union, and W. W. Foster, president of the railway. The new wage became effective on Nov. 1. Trainmen were receiving 53 cents an hour and were seeking 57 cents.

**Bonus Awarded for Safety.**—Trainmen of the Nashville Railway & Light Company, Nashville, Tenn., were paid $3,980 in bonuses for the first eight months of 1924, because accidents were reduced. Thirty-four motormen and operators on Aug. 31 had gone throughout 1924 without one accident and without failing to attend a single safety meeting by the company in the interest of accident prevention. Both of these accomplishments are the objectives of the bonus awarded every four months by the company.

# Financial and Corporate

## Net Falls Off

### Third Avenue Railway Reports a Decrease of $226,014—Will Provide Bus Service If Necessary

For the fiscal year ended June 30, 1924, the operating revenue of the Third Avenue Railway System, New York, N. Y., was $14,649,265, an increase of $242,481 compared with the fiscal year ended June 30, 1923. This statement was contained in the recent report of S. W. Huff, president, to the stockholders of the company. The operating expense was $11,173,480, an increase over the previous year of $446,496. The increase in expenses was greater than the increase in receipts, due to several causes, especially to the increased traffic congestion in the streets, resulting in the slowing up of service and the increase of accidents.

Mr. Huff said that the increase in congestion on the streets was making it more difficult to render an attractive service and was adding to the cost of operation. He stated that from data collected by his company at a number of traffic points it was shown that it took from five to seven times as much street space to pass a single passenger through the streets by means of automobiles and taxicabs as was required to pass them in street cars.

On the question of bus operation the report stated that there was unquestionably a field for bus operation, and at the present time there was a desire on the part of the public to ride in buses. President Huff said there were streets in which travel was not sufficient to justify the installation of electrical equipment, or where, for other reasons, such installation was undesirable, where buses could operate more satisfactorily and where the public was willing to pay for the increased cost of bus transportation. He said that such bus operation could be made more efficient and serviceable to the public when co-ordinated with existing trolley lines.

President Huff said it was interesting to note that today the electric surface lines of the greater city of New York were carrying a larger portion of the total number of passengers carried on surface lines, elevated lines and subway lines than they had since subway lines became a big factor in the transportation of the city. The use of surface car lines in recent years has increased faster than the use of subway and elevated lines. During the fiscal year ended June 30, 1924, more than 42 per cent of all the passengers carried by subway, elevated and surface cars were carried on the surface cars of the city.

He said that considering the present bus agitation the directors felt it was their duty to the security holders to make application for franchises for a bus system, to be operated in co-ordination with the electric lines; that the plan generally is to charge a 10-cent fare on the buses and to give free transfers to the electric lines. He said that the company had changed its motive power from the horse to cable, and from cable to electricity as the efficiency and desirability of each class of motive power was developed, and to the extent that buses are desirable as a supplement to electric car operation or as a substitute for it the directors of the Third Avenue Railway felt that they should offer them to the public.

The consolidated statement of income for the years ended June 30, 1924 and 1923, is contained in the accompanying table.

THIRD AVENUE RAILWAY COMPANY AND CONTROLLED COMPANIES YEARS ENDED JUNE 30, 1924 AND 1923

| | 1924 | 1923 |
|---|---|---|
| Operating Revenue: | | |
| Transportation | $14,232,952 | $14,008,415 |
| Advertising | 150,000 | 150,000 |
| Rent of tracks and terminals | 25,649 | 26,005 |
| Rent of buildings and other property | 175,577 | 174,695 |
| Rent of equipment | 52,610 | 34,551 |
| Sale of power | 12,474 | 13,117 |
| Total operating revenue | $14,649,265 | $14,406,784 |
| Operating Expenses: | | |
| Maintenance of way and structures | $1,829,554 | $1,425,233 |
| Maintenance of equipment | 1,523,495 | 1,934,189 |
| Depreciation accruals | 206,142 | 733,347 |
| Power supply | 1,090,857 | 1,223,968 |
| Operation of cars | 4,959,323 | 4,574,373 |
| Injuries to persons and property—expended | 1,165,882 | 1,074,590 |
| Injuries to persons and property—reserved | *202,630 | *205,513 |
| General and miscellaneous expenses | 600,855 | 564,794 |
| Total operating expenses | $11,173,479 | $10,726,984 |
| Net operating revenue | $3,475,785 | $3,679,800 |
| Taxes | 988,048 | 968,044 |
| Operating income | $2,487,737 | $2,711,756 |
| Interest revenue | 276,603 | 287,348 |
| Gross income | $2,764,340 | $2,999,104 |
| Deductions from gross income: | | |
| Interest on first mortgage bonds | $548,080 | $548,080 |
| Interest on first refunding mortgage bonds | 879,620 | 879,620 |
| Interest on adjustment mortgage bonds | 1,126,800 | 1,126,800 |
| Track and terminal privileges | 14,231 | 14,524 |
| Miscellaneous rent deductions | 8,248 | 7,782 |
| Amortization of debt discount and expense | 21,870 | 21,315 |
| Amortization of limited franchises | 9,355 | 10,904 |
| Sinking fund accruals | 33,480 | 33,480 |
| Miscellaneous | 47,392 | 55,322 |
| Total deductions | $2,689,078 | $2,697,829 |
| Net income | $75,261 | $301,275 |

*Deficit

## New Orleans Earnings Sufficient to Care for Interest Obligations

The report of the New Orleans Public Service, Inc., for the twelve months ended Sept. 30, 1924, gives the net operating income of the company at $3,466,603 for the year, a gain of $119,236 over the preceding year. The rate base of the company, upon which it is allowed a rate of return of 7.5, increased from $52,939,371 to $55,242,089, or approximately $2,203,718. This resulted in a decline in earnings to 6.48 per cent, as compared with 6.61 for the twelve months ended Sept. 30, 1923. The outstanding obligations of the company are only about 6 per cent of the rate base, which will make its earnings of 6.48 per cent for the year ample to care for all interest and dividends in outstanding securities. The total assets of the company increased from $61,126,208 to $67,838,787. Cash on hand when the report was closed was $1,335,700, with $1,576,963 on hand for materials and supplies. The sum of $1,420,592 was spent during the year for renewals and replacement reserves.

## Court Refuses to Dismiss $30,000,000 Subway Suit

Judge Knox in United States Court has denied the city's motion to dismiss the suit brought by Lindley M. Garrison as receiver for the New York Municipal Railway Corporation to recover approximately $30,000,000 from the city because of delays in the fulfilment of contracts to build subways. The motion attacked the jurisdiction of the federal court and the legality of naming the city as a defendant.

Judge Knox held that the federal court had full power "to award relief in equity upon a strictly legal demand." He wrote that the suit would "involve an inquiry which for detail, itemization and proof will probably surpass any accounting with which the court is acquainted, and it would be most unfortunate if jurors were called upon to undergo the hardships of such an ordeal."

The city's motion was made after the New York Rapid Transit Corporation, as owner of the assets of the New York Municipal Railway Corporation, had been granted leave to intervene as a party plaintiff in the suit instituted by the receiver.

## Another Block of Chicago Property's Stock Offered

Sale of 10,000 shares of prior lien, 7 per cent stock of the Chicago, North Shore & Milwaukee Railroad, Highwood, Ill., under the customer-ownership plan was announced recently by officials of the company. The stock will be sold for $100 a share, par value. This is the second block of prior lien authorized for sale by the Illinois Commerce Commission, the first block of $1,500,000 having been sold about a year ago. The second block, as in the case of the former sale, will be disposed of by employee-salesmen, every employee of the railroad who signifies his interest being made an authorized salesman of the stock.

The sale was opened at two special meetings of employees called for the purpose, which were addressed by Britton I. Budd, president, and other officials. The first block met with a ready market among patrons of the North Shore Line and it is believed that the additional $1,000,000 will go even better because of the establishment in the minds of the people of its value.

## California Commission Reviews Valuation Cases

Important work has been done by the California Railroad Commission during the last fiscal year in the matter of valuations of properties of public utilities either in rate-making proceedings or in proceedings involving condemnation of those properties by municipalities; also in the valuation of railroad properties in co-operation with the Interstate Commerce Commission. An important part of the valuation work carried on during the year has been the appraisal of lands owned by public utilities within the State of California, which has involved the determination of the value of lands amounting to approximately $20,000,000 in connection with the various proceedings.

In addition to the valuations carried on in connection with the regulatory work of the commission, a limited amount of work has been done in connection with the valuation of the Los Angeles Gas & Electric Corporation's electric properties involved in the condemnation proceeding filed by the city of Los Angeles. A relatively large staff of engineers has been employed during the entire year in connection with the determination of the value of the city properties of the Los Angeles Railway and the Pacific Electric Railway. This involves property exceeding $50,000,000. Toward the close of the fiscal year work was commenced in connection with the valuation of all the electric properties of the Pacific Gas & Electric Company and Great Western Power Company in the city of San Francisco.

## New Corporation to Develop Cities Service's Utilities

Formation of a new $100,000,000 corporation by the Cities Service Company, New York, to provide a vehicle for the development and expansion of its public utility enterprises is under way, to be known as the Cities Service Power & Light Company. Its authorized capitalization will consist of $20,000,000 of bonds, $10,000,000 of preferred stock, $5,000,000 of second preferred stock and $65,000,000 of common stock.

The Cities Service Company will own all the common stock of the Cities Service Power & Light Company, into which will be placed the common stocks of public utility companies operating in 15 states and serving a population of more than 2,000,000 scattered over 400 communities. Among the important properties to be included will be the Toledo Traction, Light & Power Company, which owns the Toledo Edison Company; the Ohio Public Service Company; Public Service Company of Colorado, including ownership of the Denver Gas & Electric Company; Kansas City Gas Company; the Empire District Electric Company and the St. Joseph Railway, Light, Heat & Power Company.

Gross business of the properties comprising the new corporation, it is understood, will total more than $49,000,000.

Formation of the new company will have no effect on the financial structure of the parent company except to provide a more flexible medium for development of the public utility phase of its business. This step is understood to have been long contemplated to establish a clear-cut division between the oil and utility enterprises of Cities Service and to make more effective the activities of the parent company in both fields.

Officers of the new company will include the principal executives of the Cities Service organization.

## Right to Discontinue Lines Sought in Mobile

Discontinuance of certain railway service at Mobile is sought by the Mobile Light & Railway Company in a petition filed with the Alabama Public Service Commission. The petition was accompanied by a financial statement for the year ended Sept. 30, 1924, to the effect that the company's net income from railway operations for the year amounted to less than 1 per cent of its valuation. The company asked permission to take up tracks on Wilkinson Street from Charleston Street to Washington Avenue and on Washington Avenue from Wilkinson Street to South Carolina Street and to abandon service on Wilkinson Street and Washington Avenue and further asks to be permitted at any time during the next two years to take up the track on Old Government Street from its intersection with Government Street to Williams Street.

## Traffic Declines on Detroit Street Railways

The city of Detroit, Department of Street Railways, has given out operating statistics for the months of July, August and September. Income and traffic figures are included in the accompanying table.

CITY OF DETROIT, DEPARTMENT OF STREET RAILWAYS

| | July, 1924 | July, 1923 | August, 1924 | August, 1923 | Sept., 1924 | Sept., 1923 |
|---|---|---|---|---|---|---|
| Total revenue from transportation | $1,598,875 | $1,660,055 | $1,592,551 | $1,671,959 | $1,587,292 | $1,766,670 |
| Total operating revenue | 1,669,815 | 1,764,174 | 1,639,962 | 1,754,349 | 1,654,788 | 1,843,027 |
| Total operating expenses | 1,175,483 | 1,299,326 | 1,168,345 | 1,314,975 | 1,170,524 | 1,360,890 |
| Net revenue railway operations | $494,332 | $464,848 | $471,617 | $439,375 | $484,264 | $482,137 |
| Taxes and rent deductions | 59,798 | 59,158 | 59,798 | 59,188 | 59,706 | 59,158 |
| Net operating income | $434,533 | $405,689 | $411,819 | $380,186 | $424,558 | $422,979 |
| Total non-operating income | 27,898 | 1,274 | 46,600 | 4,682 | 14,155 | 1,059 |
| Gross income | $462,431 | $406,963 | $458,418 | $384,868 | $438,713 | $424,037 |
| Total deductions from gross income | 432,312 | 376,012 | 428,102 | 376,929 q | 412,192 | 364,824 |
| Net income | $30,119 | $30,951 | $30,316 | $7,939 | $26,521 | $59,213 |
| Total car-miles operated | 3,828,996 | 4,327,150 | 3,774,519 | 4,346,975 | 3,683,651 | 4,157,839 |
| Total passengers carried | 35,159,475 | 40,934,203 | 34,962,639 | 41,308,449 | 34,825,027 | 38,385,837 |

## $7,000,000 Refunding Issue Approved at Worcester

Stockholders of the Worcester Consolidated Street Railway at the annual meeting in Worcester, Mass., on Nov. 5, voted to ask the State Department of Public Utilities for authority to create $7,000,000 in first and refunding mortgage bonds. The board of directors will have power to issue and sell bonds at such times and in such amounts as may be necessary to meet the maturing bond issues of the company. The bonds will be sold in series with different maturity dates and different coupon rates, depending entirely on the bond market at the time the money is needed. None of the bonds will bear interest at more than 6 per cent.

Clark V. Wood, president of the company, said the amount the directors suggested to the stockholders as a limit for the new bond issue was considerably more than the amount needed to meet the two maturities falling due in 1925. The mortgage will be so drawn that it will cover the entire property and equipment of the railway subject to the present underlying liens. Eventually, with the maturing of these liens, the new issue would become a first mortgage.

Two issues mature next year which must be met by the company. They are the Worcester & Southbridge Street Railway first gold 4½s, dated June 1, 1905, and due June 1, 1925, and the Worcester Consolidated Street Railway debenture gold 7s, dated March 1, 1900, and due March 1, 1920, but extended to March 1, 1925. The first of these issues is outstanding at present to the extent of $200,000 and the second to the extent of $700,000.

These two issues are the first of a series that will fall due within the next three years involving $3,083,000. Of the company's funded debt only three additional issues will be outstanding after 1927. One of these, totaling $1,449,000, will mature in 1930 and two others, totaling $124,000, will mature in 1939.

President Wood said the earnings of the company had been increasing slowly in the last quarter. The decrease in the gross earnings and the falling off in the number of passengers carried earlier in the year he assigned to unfavorable industrial conditions.

## Form of Electric Railway Supplement to "Chronicle" Changed

"The Public Utility Compendium" is the title which the *Commercial & Financial Chronicle*, New York, has applied to the publication issued by it on Nov. 1 to replace that paper's former "Electric Railway Section." The compendium will be issued twice a year without extra charge to every annual subscriber of the *Chronicle*.

As the change in name implies, the new publication is much more comprehensive than the old, both in character and scope. It covers public utilities of every kind and description. Light and power companies are now represented, as well as the electric railways, and in addition there are water and gas companies and tele-

graph, telephone, cable and radio corporations. It is explained in part, as follows:

In one particular the change has been forced upon us. The operation of the electric railways, urban and interurban, is now quite generally combined with the light and power business, and it is no longer possible to differentiate between the two. The development has grown out of the wonderful extension in the use of electricity which is the distinctive feature of recent times. * * * The next step was to unite the local units so that they might serve larger areas, and out of these undertakings have grown in turn the big combinations which, by reason of their splendid achievements in electrical development and in serving the advanced needs of man, are exciting the wonder and the admiration of the world.

## Brooklyn City Declares an Extra of 5 Cents a Share

Directors of the Brooklyn City Railroad on Nov. 6 declared a regular quarterly dividend of 20 cents a share and an extra dividend of 5 cents a share on the 1,600,000 shares of stock now outstanding, or $400,000. The stock is of $10 par value.

The company has paid three quarterly dividends of $300,000 each on the 1,200,000 shares of capital stock outstanding prior to Sept. 30. For the full calendar year the company will have paid to stockholders $1,300,000 in dividends, and the company's surplus, according to President H. Hobart Porter, will have been increased by about $450,000. These results are based on estimated net earnings for the year of $1,750,000, which is applicable to dividends and surplus. For the first three-quarters of the year the net was $1,394,087.

## Guaranteed Bonds of Lake Charles Property Offered

Stone & Webster, Inc., recently offered at 95 and interest $750,000 of first mortgage 5½ per cent gold bonds, known as Series A, of the Lake Charles Electric Company, Inc., Lake Charles, La., with guaranteed principal and interest by the Eastern Texas Electric Company of Delaware. The bonds were dated Aug. 1, 1924, and are due Aug. 1, 1949.

The Eastern Texas Electric Company recently purchased the street railway, electric light, gas and water systems and plants in Lake Charles, La. The purpose of the issue is to provide a portion of the funds required for the purchase of the above properties. The balance has been raised by the sale of capital stock of the Lake Charles Electric Company, Inc., the entire issue having been purchased by the Eastern Texas Electric Company of Delaware, which also controls, through stock ownership, the Eastern Texas Electric Company of Texas and the Port Arthur Ice & Refrigerating Company. The Eastern Texas Electric Company (Delaware) was recently organized to acquire and hold the stock of the Lake Charles and other companies.

The Eastern Texas Electric Company of Delaware guarantees the payment of principal and interest on this issue of series A bonds.

The Lake Charles Electric Company, Inc., has obtained new franchises during the current year, which run for a 25-year period and are free from restrictive and burdensome clauses. The properties are under the executive management of Stone & Webster, Inc.

**$400,000 in Shares Sold.**—The Wisconsin Traction Light, Heat & Power Company, Appleton, Wis., has disposed of $400,000 of its $500,000 issue of 7 per cent preferred shares. The sale was started on July 16 and the shares have been purchased by 700 new owners, most of whom are residents of the fifty-one places in which the company supplies a utility service.

**Wants to Remove Certain Tracks.**—The Union Traction Company, Santa Cruz, Cal., has applied to the Railroad Commission for permission to abandon service to Cliff Drive and to remove its tracks on Mission Street from Locust Street to Pacific Avenue.

**Carhouses Sold.**—The United Electric Railways, Providence, R. I., has sold two trolley carhouses used for storage purposes and two more are for sale at the present time.

**Authorizes Track Removal.**—Permission has been granted to the Trenton & Princeton Traction Company, Trenton, N. J., to remove as much of its track as lay between the terminus of the line in Lambertville, N. J., and the center of the bridge spanning the Delaware River between Lambertville and New Hope. Abandonment of the company's line in Pennsylvania has already been sanctioned by the Public Service Commission of that state.

**Net Income Falls Off.**—For the nine months period of the present year the Twin City Rapid Transit Company, Minneapolis, Minn., reports gross revenues of $9,527,686. This compares with $10,210,796 last year. The operating expenses decreased from $7,267,192 for the nine months period of 1923 to $6,968,918 for a similar period of the present year. The net income fell off about 36 per cent. It was $1,151,756 for the months of January to September, 1923, inclusive and $739,526 for the similar months of the current year.

**Earnings Decrease.**—For the third quarter of 1924 the St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., reports earnings for the railway department of $209,042. Compared with a similar period in 1923 the railway receipts showed a decrease of $37,794. The decrease in the earnings of the railway department has been gradual since the beginning of 1922, only two quarterly periods during that time showing a slight increase compared with the previous quarter. The banner quarter for the railway department was the last quarter of 1920, when receipts were $318,571. They are now averaging about $100,000 less than that amount.

**Manitoba Property to Suspend Service.**—The Brandon Municipal Railway, Brandon, Man., it is reported, is to cease operating and is to be replaced by buses. The Brandon Electric Railway was incorporated by the Manitoba Legislature in 1911. According to the *Canadian Railway and Marine World*, plans at that time were made for building 10 miles of line and arrangements were discussed for the city to issue debentures to aid in the construction. Finally it was agreed to take a vote of the citizens on the question of private or public ownership and the result was a vote of 458 to 176 for private ownership. A 30-year franchise was arranged and approved by the voters on May 21, 1912, but following some difficulties the city took over the project and authorized the raising of $300,000 by debentures for construction purposes. Operation for first year ended June 30, 1914, showed a loss of $14,542 and each succeeding year has continued to show a loss, with a reported loss in 1923 of $41,000. The line consists of 9.91 miles of track. It is said that tenders have been invited for the operation of buses.

**Abandonment of Lines Authorized.**—The Oklahoma Corporation Commission has authorized the Oklahoma Union Railway to abondon its Forrest Park line and the Fife Place line. The company is also given permission to take up its tracks, poles and wire on the streets included in these lines. The company first secured permission of the city through a city ordinance to abandon the lines and then took the matter up with the commission, as was noted in the ELECTRIC RAILWAY JOURNAL of Oct. 25.

**Buys Bus Line.**—The bus line between Hammond and Crown Point, Ind., has been purchased by the Gary Street Railway and is being run by that company. Three buses are now in operation between the towns and passengers are carried to Griffith, Highlands and Munster. Service to Calumet City is included in the schedule for the Gary Street Railway bus line.

**Nearly $4,000,000 in Taxes.**—Electric railways in Wisconsin, numbering twenty-one operating light, power and heat properties in connection therewith, will pay $3,560,968 in taxes for 1924, based on a valuation of $125,375,000. In 1923 these companies paid taxes of $2,171,140 on a valuation of $104,410,000. The Milwaukee Electric Railway & Light Company again heads the list with a valuation on its properties of $71,500,000 and a tax debt of $1,476,985.51.

**Revenue Falls Off.**—For the three months ended Sept. 30, 1924, the passenger revenue of the Brooklyn City Railroad, Brooklyn, N. Y., was $2,786,005, against $2,877,627 for the corresponding three months a year ago. The net corporate income fell off from $486,438 for the period ended Sept. 30, 1923, to $331,192 for the period from July to September, 1924.

**Branch Line to Be Sold.**—The receiver of the Indiana, Columbus & Eastern Traction Company, Springfield, Ohio, recently asked authority of the State Public Utilities Commission for permission to abandon and sell the branch road running from Dayton to Union City. This action was in accordance with an order of Federal Judge Killits of Toledo ordering sale of this line. The Union City branch has been losing money for some years, according to a statement made by J. M. Pogue, general manager of the company. A request has been filed by the Dayton-Columbus Transportation Company, a subsidiary of the traction company, for a certificate to operate a bus line between Dayton and Union City by way of Greenville, between

Dayton and Brookville and between Urbana and West Jefferson. It is said that the light-weight traction cars now being operated over the present route will be sent to Springfield, where they will be placed in service on the Springfield-Lima route.

**Receiver Named for Long Island Electric.**—A petition has been presented to Justice Leander B. Faber in Queens Supreme Court on behalf of the Chase National Bank, asking for appointment of a receiver in a foreclosure action which has recently been started against the Long Island Electric Railway, Long Island City. It is revealed that it is planned to try to unite the surface lines in Queens and Nassau and into one system as feeders for the elevated lines and subways that are being extended into Queens. Lincoln C. Andrews, who was formerly the general manager of the Long Island Electric Railway, has been appointed receiver.

# Book Reviews

### Electric Railway Handbook

A reference book of practical data, formulas and tables for the use of operators, engineers and students. By Albert S. Richey, consulting engineer and professor of electric railway engineering Worcester Polytechnic Institute. Second edition, 798 pages, illustrated. McGraw-Hill Book Company, New York. $4.

Since the publication of the first edition of this book in 1915 there have been many changes in electric railway practices. Unlike "Electric Railway Transportation," the second edition of which is reviewed on this page, Richey's "Handbook" treats of the material side of the railway property. While the fundamental principles of electric railways have not changed, as is indicated by the retention in the second edition of most of the matter dealing with theory that appeared in the former edition, there are striking changes shown in applications. Particularly is this true with regard to the light-weight types of car. The chapter on rolling stock has been completely rewritten.

A much greater use of track construction and maintenance machinery made necessary the complete revision of that subject. Other sections have been revised more or less extensively to conform with the latest practices. In this connection particular reference is made to the standards and practices of the American Electric Railway Engineering Association, many of which are quoted in full or in part. Numerous references to articles appearing in ELECTRIC RAILWAY JOURNAL also are included.

Comparatively few cost data appear in the new edition, but where such figures are given they are accompanied either by basic unit costs or the dates which apply, so that they can be converted to the present level.

There is much of value to the electric railway engineer in the volume, and with the many changes that appear in the new volume it is well worth while substituting it for the earlier edition.

### Transactions Index, Volume 1-45, 1880-1923

Published by the American Society of Mechanical Engineers, New York, 1924. $3.

The present index to the Transactions of the American Society of Mechanical Engineers is the fifth which has been published, although none has been issued since the appearance of Vol. 27, which contained the index to Vols. 1 to 25, inclusive. For that reason, and because comparatively few complete editions of the Transactions are available, the present index applies more particularly to Vols. 26 to 45, inclusive.

The general style of the Engineering Index, published by the society, has been followed, grouping alphabetically all items under authors' names and subjects. This index should greatly increase the value of the Transactions for reference.

### Electric Railway Transportation

By Henry W. Blake, editor ELECTRIC RAILWAY JOURNAL, and Walter Jackson, fare and motor bus consultant. Second edition, revised. McGraw-Hill Book Company, Inc., New York. 449 pages, illustrated. Cloth, $5.

This is a thorough revision of the book published in 1917 by the authors. While the same general form of presentation and chapter headings has been adhered to, there are many changes throughout the book.

When the first edition appeared the effects of the World War were just beginning to be felt. Five-cent fares were in force on nearly all city railways in America, the one-man car was just being introduced, "jitney" operation was still in its infancy, and only very few electric railways had even considered the operation of buses. The idea of merchandising transportation had made little headway, largely because most managements were content to take what revenue came naturally without special efforts toward ride salesmanship.

Many new types of cars are discussed in the chapter on "Car types in relation to traffic," showing the great progress that has been made in the design of street and interurban cars, particularly the development of light-weight and one-man designs. The chapters on adjustment of service to traffic and preparation of timetables have both been revised in the light of new developments looking toward greater utilization of men and equipment.

The complete revolution which has taken place in fares and fare collection methods and practices is shown by the entire revision of the chapters on these subjects. Practically every type of fare and fare collecting method in use in this country, and many developed abroad, are discussed.

A new chapter on motor bus operation by electric railways traces the development of this phase of the industry from its inception, considering the field of this vehicle and types of equipment desirable. Trackless trolleys and gas or battery rail cars are also treated briefly in this chapter.

To make room for the added material the chapters on "competition" and "freight and express" have been omitted from the second edition. The authors state that the former is covered in the chapter on motor-bus operation, while there have not been many changes in freight and express practices since 1917.

### Elektrische Zugförderung

Train or Car Operation. By Dr. E. E. Seefehlner, Vienna. With a chapter on Rack and Cable Railways, by H. H. Peter, Zurich, 659 pages; 751 illustrations. Second and enlarged edition. Published by Julius Springer, Berlin.

This is the most extensive and scholarly volume on electric railway engineering published in Germany since Zehme's important treatise. As in the first edition, which was published in 1922, Dr. Seefehlner has limited the scope of his book very largely to the purely electrical engineering side of electric railroading; that is to say, he does not include track except so far as the return circuit is concerned, considers power stations only briefly, and does not discuss transportation questions. Heavy electric traction is treated more comprehensively than tramways, and there is an especially valuable section of 84 pages giving data, drawings and photo-engravings of the principal electric locomotives in different parts of the world. The subject of train resistance is very thoroughly discussed and in this section, as elsewhere in the book, mathematics is used extensively where it helps to clarify the discussion. In the chapter by Mr. Peter, the cable railways considered are primarily those for mountain installations. A valuable feature of the book is the inclusion, with the discussion of each subject, of an extended bibliography on that particular topic. American practice is treated in the book, and the ELECTRIC RAILWAY JOURNAL is extensively quoted.

### Principles of Business Writing

By T. H. Bailey Whipple, literary critic Westinghouse Electric & Manufacturing Company, published by the Westinghouse Technical Night School Press, East Pittsburgh, 192 pages.

Originally the chapters in this book were prepared by Mr. Whipple for "Sales Letter," a Westinghouse publication intended for private circulation, and its purpose was to help in the production of clear letters and reports by those to whom it was addressed. The demand from outside, however, became so great that it was decided to put the material in book form. There are five parts as follows: I. Introduction. II. Principles of Business Letter Writing. III. Words and Phrases Often Misused. IV. Report Writing. V. Letter Writing. There is also an appendix, including some suggestions to authors of technical papers. The book is well worth inclusion in the library of every one who has occasion to do much business or technical writing.

# Personal Items

**A. C. Jordan,** general electrical superintendent of the Elmira Water, Light & Railroad Company, Elmira, N. Y., has been relieved of the supervision of the maintenance of railroad equipment department. F. G. Maloney, superintendent of the railroad department, now has charge of the maintenance of equipment department as well as of track and transportation departments. These changes were made effective Oct. 22.

**Sterling T. Dow** will resign as manager of the York Utilities Company, Sanford, Me., on Dec. 1. He has been connected with the railroad company for fifteen years, being assistant treasurer for ten years, before his promotion to general manager. He was at one time freight agent of the Maine Central Railroad at Bangor and resigned to become assistant treasurer of the York Utilities. The York Utilities Company, formerly the Atlantic Shore Line Railroad, operates cars from Sanford to Biddeford, through Kennebunk and from Town House to Cape Porpoise and Kennebunkport.

**A. L. C. Fell,** general manager of the London County Council Tramways, is retiring, owing to ill health. He has occupied the post for 21 years. Much regret is felt in British tramway circles, as Mr. Fell is one of the best known and most highly esteemed men in the fraternity. Prior to coming to London he was manager of the Sheffield Corporation Tramways. He is a prominent member of the Municipal Tramways Association. He is an engineer by training and has been able to supervise alike the technical and administrative sides of the business. Mr. Fell is 55 years of age. He will receive a retiring allowance of about £1,000 a year. Mr. Fell was one of the men who took great pains to assist the A.E.R.A. committee on foreign operation in making its observations this past summer.

**W. H. Sawyer** was the principal speaker at a meeting of the Women's Republican Club of East St. Louis shortly before election day. It is not often that a public utility man will make the personal sacrifice to get out and do his bit for the cause of good government. Mr. Sawyer spoke at some length in behalf of Mr. Coolidge and Mr. Dawes, both of whom he has known personally for some 40 years.

**W. W. Tarleton** became assistant purchasing agent of the Georgia Railway & Power Company on Oct. 1. He was formerly purchasing agent of the Dixie Construction Company, a branch of the Alabama Power Company.

**Fred W. Spring,** superintendent of the Westbrook division of the Cumberland County Power & Light Company, Portland, Me., for the last 32 years, recently retired. His first position was that of a railroad conductor when the company was building the Westbrook road in 1891. For six months Mr. Spring was in charge of the construction work. When the road was opened on June 28, 1892, Mr. Spring was appointed superintendent. He has held that position continuously since then. Mr. Spring's son, Frank B. Spring, who has been his assistant for a number of years, has been promoted to succeed his father. Harry K. Higgins will become the assistant superintendent.

## D. S. McManus Superintendent at Lake Charles

The new superintendent of the Lake Charles Electric Company, Inc., Lake Charles, La., is D. S. McManus, who was transferred recently from the Houston Electric Company, Houston, Tex.

Mr. McManus has been in the railway field a comparatively short time, but in a period of four years he has proved himself invaluable to his management. He entered the employ of the Houston Electric Company, a Stone & Webster property, on Sept. 1, 1920,



D. S. McManus

after being graduated from college as electrical engineer. He served in the various departments until July 1, 1921, at which time he was made assistant to the manager of the Houston Electric Company and the Galveston-Houston Electric Railway. In that capacity he remained for more than a year and was then transferred to Lake Charles, where he is now in charge of the street railway, construction and distribution systems of the light and power, water and gas departments, as well as the delivery departments of the ice plant.

The property with which Mr. McManus is now associated is under the executive management of Stone & Webster and is controlled by the Eastern Texas Electric Company of Delaware. The Lake Charles Electric purchased the old Lake Charles Railway, Light & Water Works Company on Aug. 1 of this year.

**Unosuke Kurihara,** chief secretary of the car operation department of the Municipal Electric Bureau, Tokio, is on a visit to this country to study electric railway operation, particularly rapid transit conditions. Later he expects to visit Europe.

**Ivor Fraser,** publicity manager of the London Underground electric railway companies, has resigned that office to become manager of the *Morning Post* London. A. L. Barber, commercial manager of the companies, will for the time carry on the duties of publicity manager in addition to his regular work. It was under Mr. Fraser's direction that much of the excellent work in bettering public relations in London has been done for the so-called Underground group. This work included the advertising of the lines, one of the most important features of which was the use of art posters, which have attracted attention in all parts of the world. American electric railway men will remember Mr. Fraser as one of the party of London Underground railway officials that visited this country in May, 1923.

# Obituary

**Maurice Tremper,** roadmaster of the Seattle Municipal Railway, Seattle, Wash., a system which comprises 235 miles of line, for ten years, died in that city recently, at the age of 57 years. Mr. Tremper before going to Seattle was roadmaster of the Detroit United Railway for 12 years.

**Charles A. Piper,** for ten years superintendent of the Key System Transit Company, Oakland, Cal., died suddenly in that city, Oct. 26. Mr. Piper was identified with the Key System ever since its establishment in Oakland. During the first ten years of the company's existence he served as general superintendent. He was 57 years old.

**F. J. Frey,** division superintendent of the Fresh Pond division of the Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y., died recently, after an illness of several months. Mr. Frey started in as a motorman with the Brooklyn Company twenty-nine years ago. He was appointed division superintendent. Mr. Piper was 57 years old.

**William Gray Evans,** a pioneer of Colorado and the man who took a conspicuous part in the organization of the Denver Electric & Cable Company, now the Denver Tramway Company, died Oct. 21, after an illness of three weeks. For many years he was president of the latter company, but resigned that office in 1913. Mr. Evans was the son of John Evans, who founded Northwestern University at Evanston, which is named after him. John Evans was appointed Governor of Colorado by President Lincoln. William Evans inherited many of the sturdy characteristics of his illustrious father, so much so that the son was characterized at one time as the most dominating personality in Denver life. He was interested in several banking institutions and at one time was head of the local Republican organization in Denver. It was Mr. Evans who had the idea of the Moffat tunnel through the Continental Divide. When the story of the Denver & Salt Lake Railway (Moffat Route) is told, his name will be linked with that of David H. Moffat.

# Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

## $7,000,000 Spent at Los Angeles for Equipment

During the present year the Pacific Electric Railway management has contracted for varied freight and passenger equipment the cost of which entails an outlay of $4,377,000, all of which will be delivered and available for service during the current year. For its local lines 50 new 600 class cars, of the new type used in the Hollywood service, are now being built by the Brill Company of Philadelphia. Delivery at the rate of six cars weekly is scheduled to begin within 60 days, and following their arrival will be sent to the Torrance shops of the company, where electrical equipment will be installed. These cars, seating 65 passengers, have proved highly satisfactory both to the public and management and were so designed as to be capable of being operated in three-car units, which will be done upon the completion of the Hollywood-Glendale-San Fernando Valley tunnel now in course of construction.

To augment its freight equipment, 1,350 assorted freight cars were ordered several months ago, approximately 33 per cent of which have been received in recent months and complete delivery of which will be fulfilled within the next few months. With these cars available the Pacific Electric, which is the third largest carrier in point of freight volume handled in California, will be in a position to meet any demand made upon it by Southern California shippers. This lot of 1,350 freight cars cost approximately $3,000,000 and is the largest freight equipment order ever placed by the Pacific Electric.

Additional power will be supplied through five 60-ton freight locomotives, material and equipment for which is now being assembled for construction at the Torrance shops of the company. The railway's shops were the lowest bidders on the construction of this equipment and the work was awarded to its own mechanical department. These locomotives are the largest and most powerful type ever built on the Pacific Coast and cost approximately $45,000 each.

Both single and double deck motor coaches have been delivered or ordered during the present year to the extent of $150,000. Several double-deck buses will be delivered soon and will go into service on the lines of the Los Angeles Motorbus Company, jointly owned and operated by the Los Angeles and Pacific Electric Railways.

The foregoing equipment represents rolling stock ordered during the present year, but does not include 50 600-class cars and 50 1,100-class interurban cars ordered during 1923 on which delivery has been made recently. This lot of equipment represents an outlay of $2,850,000, which, together with that ordered during the present year, makes an aggregate outlay of $7,227,000 for equipment, all of which will be delivered during the present year.

## Railway Modernization in Java

The Java State Railways is buying modern cars and trailers for suburban passenger service in the section that includes the cities of Batavia and Meester Cornelis. The General Electric Company is electrically equipping 10 of the cars and the Westinghouse Electric & Manufacturing Company 5. The other 15 of the 30 cars on order are trailers. The Electric Storage Battery Company is furnishing Exide batteries and the J. G. Brill Company the car seats. The pneumatic door-opening mechanism is manufactured by the Consolidated Car Heating Company and the rubberoid by the Standard Paint Company. The all-steel bodies are being built in Holland.

The trolley voltage is 1,500 d.c., and each motor car will carry a motor-generator set to supply 65-volt current for operating the control mechanism and air compressors, supplying the lights and charging the storage batteries. The so-called subway type of ceiling fan will be used in motor cars and trailers.

## Free Nation-Wide Employment Service Urged

The establishment of a free nation-wide public employment service, to be maintained by the states in co-operation with the federal and local governments, for the benefit of men, women and juniors in all walks of life, is recommended by the Russell Sage Foundation in a 600-page report on employment methods, needs and agencies which was made public on Oct. 20 as the result of a five-year study which took the foundation's investigators into more than 70 cities of the United States and Canada.

The full report is being submitted to President Coolidge and to the governors of the states. The outstanding facts in the foundation's findings and its recommendations will be brought to the attention also of municipal and county officials, employers' associations, labor organizations, civic and social agencies and the executives of other organizations concerned with the general problems of employment or unemployment. The importance of the foundation's studies in this field becomes apparent when it is recalled that a preliminary statement made public several weeks ago showed that unemployment is no longer an occasional problem, but a constant phenomenon affecting large numbers of workers in every community.

Shelby M. Harrison, director of the department of surveys and exhibits of the Russell Sage Foundation, was in charge of the studies on which the report is based.

In conclusion the report says:

> Whichever proves finally the more desirable, an exclusively federal or a federal-state-local employment service, it is commonly conceded that the former is not at present feasible, and with this we are in agreement. To think that Congress, either now or in the immediate future, would appropriate $10,000,000 for an employment service, an amount estimated as necessary to provide an adequate basis is an idle dream. Expediency demands combined federal-state-local administration. We must begin with what we have.



New Type of All-Steel Interurban Cars, 50 of Which Were Delivered Recently to the Pacific Electric Railway

## Metal, Coal and Material Prices

| Metals—New York | Nov. 4, 1924 |
|---|---|
| Copper, electrolytic, cents per lb. | 13.375 |
| Copper wire base, cents per lb. | 13.125 |
| Lead, cents per lb. | 8.65 |
| Zinc, cents per lb | 6.575 |
| Tin, Straits, cents per lb. | 53.00 |
| **Bituminous Coal f.o.b. Mines** | |
| Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons | $4.475 |
| Somerset mine run, Boston, net tons | 2.05 |
| Pittsburgh mine run, Pittsburgh, net tons | 1.875 |
| Franklin, Ill., screenings, Chicago, net tons | 1.375 |
| Central, Ill., screenings, Chicago, net tons | 1.125 |
| Kansas screenings, Kansas City, net tons | 2.00 |
| **Materials** | |
| Rubber-covered wire, N. Y., No. 14, per 1,000 ft. | $6.25 |
| Weatherproof wire base, N. Y., cents per lb. | 17.75 |
| Cement, Chicago net prices, without bags | 2.20 |
| Linseed oil (5-lb. lots), N. Y., per gal. | $1.115 |
| White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots | 0.152 |
| Turpentine (bbl. lots), N. Y., per gal. | 0.875 |

## *Rolling Stock*

**Long Island Railroad, New York,** has placed an order for 40 electric cars, to cost approximately $1,200,000. This represented the 1925 allotment for new equipment. The Westinghouse Electric & Manufacturing Company has received the contract for the electrical equipment in the new cars, which will cost about $450,000.

**Toledo & Indiana Railroad, Toledo, Ohio,** has placed seven new cars built by the Cincinnati Car Company in service between Toledo and Bryan. The cars are 45 ft. long, weigh 30,000 lb., seat 50 passengers, and have a maximum speed of 55 m.p.h. The new equipment includes white dome lights, electric foot warmers, and standard green plush automobile type cushion seats.

**International Railway, Buffalo, N. Y.,** through its subsidiary, the International Bus Corporation, has ordered 16 double-deck buses for the Delaware Avenue line and 12 single-deck buses for the Delaware Avenue line. The double-deck buses will cost $176,000 and the single-deck buses $106,000.

**Wisconsin Public Service Corporation, Green Bay, Wis.,** plans to replace the present four 25-hp. motors and trucks on its four interurban cars on the Green Bay-Kaukauna line with new trucks and 35-hp. motors.

**Philadelphia & Western Railway, Norristown, Pa.,** has put in service a new light-weight interurban car built by the J. G. Brill Company with Brill light-weight trucks. The car weighs 57,000 lb. It is 50 ft. long by 9 ft. 6 in. wide and seats 65 passengers. The equipment consists of four Westinghouse 535-B1 motors, each of 60 hp. capacity. The control equipment is Westinghouse panelboard type with modifications so that this equipment will operate in trains with two other types of equipment now used by the Philadelphia & Western road. Westinghouse air brakes are used.

## *Track and Line*

**Boston, Mass.**—The Boston Transit Department announces that bids will be open on Nov. 25 for the first section of trackage and incline 1,300 ft. long to connect the Boston Railway tunnel line at Andrew Square with the New Haven track grade. This is in line with the Shawmut branch electrification.

**Milwaukee Electric Railway & Light Company, Milwaukee, Wis.,** plans to build an electric freight line from its Lakeside power plant to connect with the Chicago & Northwestern Railway.

**Philadelphia Rapid Transit Company, Philadelphia, Pa.,** has announced its readiness to build an extension of its tracks from Fifth Street and Olney Avenue to Fifth Street and Green Lawn, with a loop at the latter point.

**Inter-City Terminal Railway, North Little Rock, Ark.,** has been given the right to extend its lines along East Second Street to the city limits and along East Seventh and East Eighth Streets to B Street, according to an ordinance passed recently by the City Council by a vote of 7 to 2. The ordinance requires the company to pave between the rails and for 18 in. on each side of the track.

**United Railways, St. Louis, Mo.,** has just completed the double tracking of Franklin Avenue for a distance of more than a mile at a cost of $230,000. When Easton Avenue between Twenty-eighth and Thirtieth Streets is widened it will be made a double-track street.

**Southern Public Utilities Company, Charlotte, N. C.,** has started work at Winston-Salem on the rehabilitation of the line to Southside. The work, including a large amount of paving, will cost approximately $6,000.

## *Trade Notes*

**Combustion Engineering Corporation, Detroit, Mich.,** announces that James Cleary, formerly manager of its Philadelphia office, will assume management of the Detroit and Cleveland territories, with headquarters in Detroit. Frank Henderson will continue in charge of the Cleveland office. Joseph Lappin, formerly in charge of the Detroit office, has been assigned to New York for special work. The Detroit office has moved from the Penobscot Building to the Book Building.

**Cameron & Barkley Company, Charleston, S. C.,** have been appointed district representatives for the Central Iron & Steel Company's Charleston district.

**Hubbard & Company, Pittsburgh, Pa.,** manufacturers of pole line hardware, will erect a plant at Emeryville, Cal., to supply better the Western trade. It is expected that this plant will be completed and in operation by the middle of October. R. M. Kerschner, formerly sales manager of the electrical department, has been made Pacific Coast manager and has taken up his new duties.

**Frank A. Wilch,** who has been associated with the Cleveland office of the Triumph Electric Company of Cincinnati, has been placed in charge of that territory. He succeeds Edward S. Ford.

**Economy Electric Devices Company, Chicago, Ill.,** announces that it has been appointed Central Western sales representative for the Chausse Oil Burner Company's kerosene burning torches and burners. These burners are used in connection with Babbit melters, enameling ovens and baking ovens.

**Electric Service Supplies Compa Philadelphia, Pa.,** is now occupying n and larger offices in the Hudson T minal Building, 50 Church Street, N York. The room number is now 15

**Thomas K. Scott** has been appoint Mid-West sales manager of the Tayl Wharton Iron & Steel Compa Easton, Pa. He will be located Denver, Col., in charge of the sales d trict of which Denver is headquarte Mr. Scott has had a wide and profitab experience in mining. He entered t Columbia School of Mines in 1904, b left before completing his course order to take up work for the Cumbe land Ely Copper Company, Nevada. 1908 he re-entered Columbia and co pleted his course, receiving the degr of engineer of mines. He has late been chief engineer of Miami Copp Company.

## *New Advertising Literature*

**Ohio Brass Company, Mansfiel Ohio,** has issued a new pamphlet givin information on the installation of i arc weld bonds.

**Ramsey Chain Company, Albany N. Y.,** has issued an interesting treatis "Power Transmission with Ramse Silent Chain."

**Westinghouse Electric & Manufac turing Company, East Pittsburgh, Pa.** has recently issued Leaflet 20,190, in cluding ten sheets, one each devoted t illustration and specific weights, dimen sions and ratings on locomotives whic have been built for the Pennsylvani Railroad, New York, New Haven & Hartford Railroad and Chicago, Mil waukee & St. Paul Railway.

**Nichols-Lintern Company, Cleveland Ohio,** has issued a new catalogue, "Fi of Products by N-L." They give infor mation and data on ventilators, indicat ing signals, stop-signals, lanterns and all other N-L products.

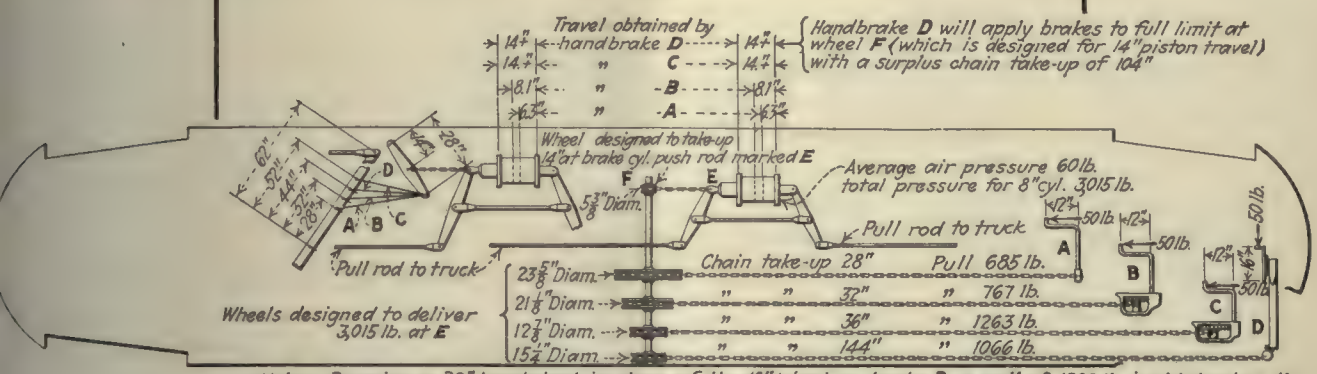
**Shepard Electric Crane & Hoist Com pany, Montour Falls, N. Y.,** has issued a 60-page illustrated booklet entitled "Floor-Operated Electric Hoists." The pamphlet gives information regarding capacities, heights of lift and prices, as well as a description of each type of floor-operated hoist made by the Shepard Electric Crane & Hoist Company.

**Griscom-Russell Company, New York, N. Y.,** has issued a new bulletin on Russell U-tube storage heaters. One of the features is the completeness, logical arrangement and legibility of the tables. These tabes cover a large number of steam pressures as well as initial and final water temperatures, and include complete details of tank sizes, capacities and dimensions for a wide range of storage capacities. Besides a complete description with details of construction and specifications of the Russell U-tube storage heater, the bulletin also contains a valuable table of data which has not hitherto been published on hot water requirements for various industrial and domestic uses.

**Crouse-Hinds Company, Syracuse, N. Y.,** has issued Folder No. 17, on arktite circuit-breaking plugs and receptacles.

# Is it safe?

## That's the Important Question!




Note:- By using a 20" handwheel in place of the 16" wheel on brake D, a pull of 4333 lb. is obtained on the brake chain, and the diameter of the sheave wheel can be reduced to 12¼"

## What about your brake equipment?

Not what it costs! Not what somebody thinks! Not what it might be!

The actual engineering study of braking conditions and forces tells the story. Unless a hand brake will maintain the *full braking power* throughout the entire piston travel, it's not a safe brake!

Read the interesting article on this subject in your September 13th issue of Electric Railway Journal.

Think it over!


September 13, 1924 ELECTRIC RAILWAY JOURNAL

# Getting Full Value from Hand Brakes on Air-Brake Cars

**As an Auxiliary to Air-Brake Equipments the Hand-Brake Parts Should be Designed and Maintained so that Full Braking Pressure, Equivalent to that Supplied by the Air-Brake Cylinder, Will Be Available Throughout the Entire Travel of the Piston**

*By J. S. McWhirter*

Superintendent of Equipment Third Avenue Railway System, New York City

WHEN deciding on the proportion of levers and other brake-rigging parts in connection with the use of hand brakes on electric railway cars, the problem must be considered from one of two distinct

piston. In this respect hand air brakes in use on many of the cars throughout the country tod... unsatisfactory.


## National Brake Co., Inc.

890 Ellicott Sq., Buffalo, N. Y.

**Canadian Representative: Lyman Tube & Supply Company, Limited, Montreal, Canada**

# Bankers and Engineers


**Ford, Bacon & Davis**
Incorporated
**Engineers**
115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

**The J. G. White Engineering Corporation**
Engineers—Constructors
Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads
43 Exchange Place New York

**STONE & WEBSTER**
Incorporated
EXAMINATIONS REPORTS APPRAISALS
ON
INDUSTRIAL AND PUBLIC SERVICE PROPERTIES
NEW YORK BOSTON CHICAGO

**JOHN A. BEELER**
Operating, Traction and Traffic Investigations
Routing Surveys—Valuations—Operation
Management
52 Vanderbilt Ave., NEW YORK

**SANDERSON & PORTER**
ENGINEERS
REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS
RAILWAY, LIGHT and POWER PROPERTIES
CHICAGO NEW YORK SAN FRANCISCO

**ENGELHARDT W. HOLST**
*Consulting Engineer*
Appraisals, Reports, Rates, Service Investigation, Studies on Financial and Physical Rehabilitation Reorganization, Operation, Management
683 Atlantic Ave., Boston, Mass.

**ALBERT S. RICHEY**
ELECTRIC RAILWAY ENGINEER
WORCESTER, MASSACHUSETTS
REPORTS - APPRAISALS - RATES - OPERATION - SERVICE

**J. ROWLAND BIBBINS**
*Engineer*—2301 Connecticut Ave., N. W. Washington, D.C.
TRANSPORTATION SURVEYS
Organized Traffic Relief and Transit Development
Co-ordinating Motor Transport, Railroad and City Plans, Service, Routing, Valuation, Economic Studies
EXPERIENCE IN 20 CITIES

**STEVENS & WOOD, INC.**
Design and Construction of Power Stations
Railroad Electrification, Industrial Plants
REPORTS AND APPRAISALS
*Management and Financing of Utilities and Industrials*
Mahoning Bank Bldg. Youngstown, O.
120 Broadway New York

**JOE R. ONG**
Consulting Transportation Engineer
*Specializing in Traffic Problems and in Methods to Improve Service and Increase Efficiency of Operation*
PIQUA, OHIO

**HEMPHILL & WELLS**
CONSULTING ENGINEERS
Gardner F. Wells Albert W. Hemphill
*APPRAISALS*
INVESTIGATIONS COVERING
Reorganization Management Operation Construction
43 Cedar Street, New York City

**Dwight P. Robinson & Company**
Incorporated
Design and Construction of
*Electric Railways, Shops, Power Stations*
125 East 46th Street, New York
Chicago Youngstown Atlanta Philadelphia
Los Angeles Montreal Rio de Janeiro

**WALTER JACKSON**
*Consultant on* Fares and Motor Buses
Originator of unlimited ride, transferable weekly pass. Campaigns handled to make it a success.
143 Crary Ave., Mt. Vernon, N. Y.

**DAY & ZIMMERMANN, INC.**
ENGINEERS
DESIGN - CONSTRUCTION - REPORTS
VALUATIONS - MANAGEMENT
NEW YORK PHILADELPHIA CHICAGO

**KELLY, COOKE & COMPANY**
Engineers
149 BROADWAY NEW YORK
424 CHESTNUT STREET PHILADELPHIA

The Most Successful Men in the Electric Railway Industry read the
**ELECTRIC RAILWAY JOURNAL**
Every Week

# AMERICAN BRIDGE COMPANY

EMPIRE BUILDING, 71 BROADWAY, NEW YORK

***Manufacturers of Steel Structures of all classes, particularly***

## BRIDGES AND BUILDINGS

*SALES OFFICES:*

*NEW YORK, N. Y. . Empire Bldg., 71 Broadway*
*Philadelphia, Pa., Widener Bldg., N. W. Cor. Chestnut and Juniper Sts.*
*Boston, Mass. . . . . 120 Franklin St.*
*Baltimore, Md., Continental Bldg., Cor. Calvert and Baltimore Sts.*
*PITTSBURGH, PA. . Frick Bldg., 440 Fifth Ave.*
*Cincinnati, Ohio . Union Trust Bldg., 36 East 4th St.*
*Cleveland, Ohio, Rockefeller Bldg., 614 Superior Ave., West*
*Detroit, Mich. . . Beecher Ave. and M. C. R. R.*
*CHICAGO, ILL. . . . . 208 South LaSalle St.*
*St. Louis, Mo., Liberty Central Trust Bldg., 506 Olive St.*
*Denver, Colo., First National Bank Bldg., 820 17th St.*
*Salt Lake City, Utah, Walker Bank Bldg., 175 S. Main St.*
*Duluth, Minn. . Wolvin Bldg., 229-31 West 1st St.*
*Minneapolis, Minn. . . 629 2nd St., S. E.*

*Pacific Coast Representative:*
*U. S. Steel Products Co., Pacific Coast Dept.*

*San Francisco, Cal., Rialto Bldg., 116 New Montgomery St.*
*Portland, Ore. . Selling Bldg., 322 Adler St.*
*Seattle, Wash. . 4th Ave., So., Cor. Conn. St.*

*Export Representatwe: United States Steel Products Co., 30 Church St., N. Y.*

The Most Successful Men in the Electric Railway Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

C. B. BUCHANAN, President — W. H. PRICE, JR., Sec'y-Treas. — JOHN F. LAYNG, Vice-President

BUCHANAN & LAYNG CORPORATION

*Engineering and Management, Construction, Financial Reports, Traffic Surveys and Equipment Maintenance*

BALTIMORE, 825 Equitable Bldg. — Phone: Hanover 2142 — NEW YORK, 49 Wall Street

**JAMES E. ALLISON & CO.**
**Consulting Engineers**
**Specializing in Utility Rate Cases and Reports to Bankers and Investors**
**1017 Olive St., St. Louis, Mo.**

**Transmission Line and Special Crossing Structures, Catenary Bridges**
WRITE FOR OUR NEW DESCRIPTIVE CATALOG
**ARCHBOLD-BRADY CO.**
Engineers and Contractors — SYRACUSE, N. Y.

**Bureau *of* Commercial Economics, *Inc.***
*Industrial Engineers*
Organization • Methods • Layout and Facilities
Public and Industrial Relations
72 West Adams Street • CHICAGO

**THE P. EDWARD WISH SERVICE**
50 Church St. — *Street Railway Inspection* DETECTIVES — 131 State St.
NEW YORK — BOSTON

**HUMAN ENGINEERING**
***Railway Audit and Inspection Company, Inc.***
*Fourth and Chestnut Sts., Philadelphia*
Boston, New Orleans, New York, Pittsburgh — BRANCHES — Baltimore, Chicago, Atlanta, St. Louis

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.



# Collier Service

A nation-wide organization building and sustaining car cardadvertising space values



**Barron G. Collier, Inc.**
Candler Bldg.
**New York**

## Before you buy POLES—See Weyerhaeuser



THE KOOTENAI, IDAHO, POLE YARD
One of the five immense Weyerhaeuser storage yards where poles are seasoned and prepared for shipment.

# Poles are a Specialty Not a Side Line With Us

ON THE Weyerhaeuser timber holdings in the Panhandle of Idaho there is as fine a lot of Red Cedar pole material as you can find anywhere.

That is why the Weyerhaeuser mills years ago began to manufacture high quality poles and why they are today among the largest producers in the country of Idaho Red Cedar Poles.

In this organization poles receive the specialized attention which their production and distribution require. Experienced pole men are in charge of each detail from the selection and felling of the trees in the forest to the shipment of poles to destination.

It is economically possible for the Weyerhaeuser mills to use especial care and extra high standards in the selection of pole material because of the magnitude and diversity of their lumber manufacturing operations. There is no temptation to make poles out of anything other than first class pole timber. Material unsuitable for poles is cut up for other purposes.

Weyerhaeuser poles are now offered to you on a value for value service basis. Shipment from any one of our five well stocked, fully equipped, Western storage yards direct to you without any unnecessary handling charges.

In looking to Weyerhaeuser as one of your major sources of supply, you do so with the assurance that you will be taken care of at all times. The next time you are in the market for poles or piling—either treated or untreated—give this Weyerhaeuser service a tryout. Your inquiries and your orders will be given prompt attention by experienced pole men.

## WEYERHAEUSER SALES COMPANY

*Distributors:* WEYERHAEUSER FOREST PRODUCTS
General Offices • SPOKANE, WASHINGTON

*Branch Offices*

ST. PAUL
2694 University Ave.

CHICAGO
208 South La Salle St.

BALTIMORE
812 Lexington Bld.

NEW YORK
220 Broadway

F. H. Burke, Chicago Office, Manager of Cedar Pole Sales
R. L. Bayne, Spokane Office, Manager of Cedar Pole Service

# Weyerhaeuser Idaho Red Cedar Poles

Brake Pins
Brake Hangers
Brake Levers
Pedestal Gibs
Brake Fulcrums
Center Bearings
Side Bearings
Spring Post Bushings
Spring Posts
Bolster and Transom Chafing Plates
Manganese Brake Heads
Manganese Truck Parts
Bushings
Bronze Bearings
McArthur Turnbuckles





# "Down the line"

Look down the Boyerized line, listed at the left.

Check those classes of equipment parts which you have to renew most frequently.

Then resolve to order and use only *Boyerized* parts hereafter. They last longer and afford greater safety in vital spots because of their tough enduring qualities.

**Write us for quotations on parts you want to put in stock now.**

## Bemis Car Truck Company, Springfield, Mass.

***Electric Railway Supplies***

**Representatives:**

Economy Electric Devices Co., Old Colony Bldg., Chicago, Ill.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.
W. F. McKenney, 54 First Street, Portland, Oregon
J. H. Denton, 1328 Broadway, New York City N. Y.
A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.

# 50,000 Tons NEW RAILS

First Quality
Hunts Inspected

80*- 85*- 90* ASCE and
other sections complete
with accessories.




Real
Savings
for Buyers

Immediate Delivery
From Stock
*1 ton or 1000*

PHONE, WIRE OR WRITE FOR PRICES

L·B·FOSTER CO·
PITTSBURGH, PA. - NEW YORK CITY

The
Boston Elevated
Railway Company

Uses

TEX
OILS AND

TEXACO

On all their
Rolling Stock—

Surface—Subway—Elevated



# ACO GREASES

## The Texas Company

Dept. R. J., 17 Battery Pl., New York City

# AGASOTE
TRADE MARK

# PANTASOTE
TRADE MARK

*Standard for Electric Railways*

**THE PANTASOTE COMPANY, INC.**

People's Gas Bldg. Chicago
11 Broadway New York
683 Atlantic Ave. Boston
Penobscot Bldg. Detroit
Monadnock Bldg. San Francisco

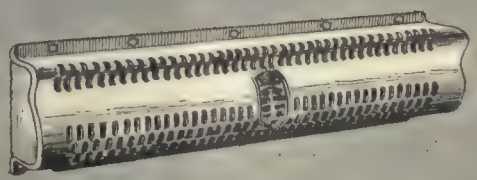


**70% to 80% of the riding public is carried by the electric railways**

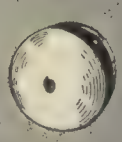
Nearly all of the hundred thousand cars used have one or more kinds of Consolidated Equipment



DOOR ENGINES–
DOOR CONTROL

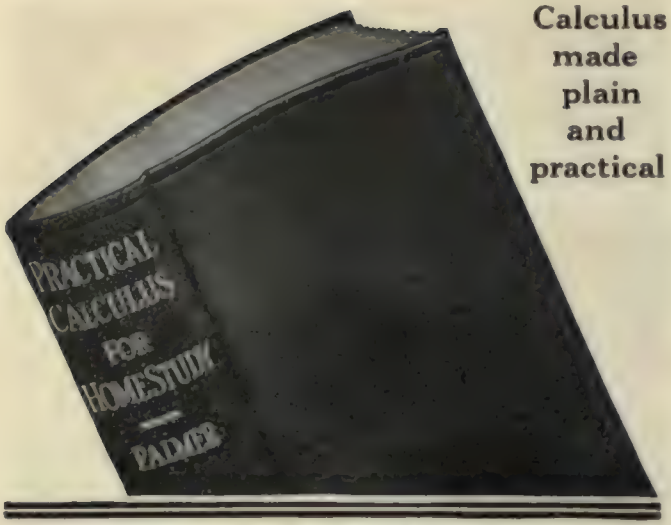


ELECTRIC CAR HEATERS–
ELECTRIC CAB HEATERS–
THERMOSTAT CONTROL



SINGLE STROKE BELLS–
PUSH BUTTONS

Consolidated Car Heating Co.
Albany, N.Y.




Calculus made plain and practical

## The first practical book on Calculus for Practical Men

Here is a plain, clear and thorough book that will give the practical man the ability to make use of the calculus as he needs it in his work. The author says in his introduction: "The subject of calculus cannot be made *easy*, but it can be made *plain*." To this end he has written this book.

*Palmer's*

# Practical Calculus for Home Study

**By C. I. Palmer**

Armour Institute of Technology

***443 pages, pocket size, flexible, 186 illustrations, $3.00 net, postpaid***

This book is for the man with limited mathematical training who has need for a working knowledge of calculus and its practical applications. It shows just what kind of problems can be solved with the aid of calculus and explains thoroughly and clearly how.

### *You have been waiting for this book*

A working knowledge of calculus is of such advantage that hundreds of men have been asking for just such a simple and understandable book as this one. The book avoids involved mathematical terms and phrases. It covers every point plainly. It tells you the many practical uses to which calculus can be put—how you can use it daily—how it can help in your work.

### *Calculus made plain for you*

Calculus has been made thoroughly plain in this book. The fundamentals are repeated over and over again so that once grasped as the book offers them they will remain with you. You will know them. You will know how and when to use them. And you will find the knowledge of the greatest help in your daily work.

### *Examine a copy for 10 days free*

Examine this book free—send the coupon for a copy—see for yourself how plain and understandable the book is. You're not obliged to keep it. See it, surely.

**McGRAW-HILL**

**FREE EXAMINATION COUPON**

McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York.

You may send me on 10 days' approval Palmer's Practical Calculus for Home Study, $3.00 net, postpaid. I agree to remit for the book or to return it postpaid within 10 days of receipt.

Signed .....

Address .....

Official Position .....

Name of Company .....

(Books sent on approval to retail purchasers in U. S. and Canada only.)

E. 11-8-24

# SLEET CUTTING DEVICES



Nuttall Sleet Wheels replace the standard trolley wheels and efficiently clean sleet coated wires.



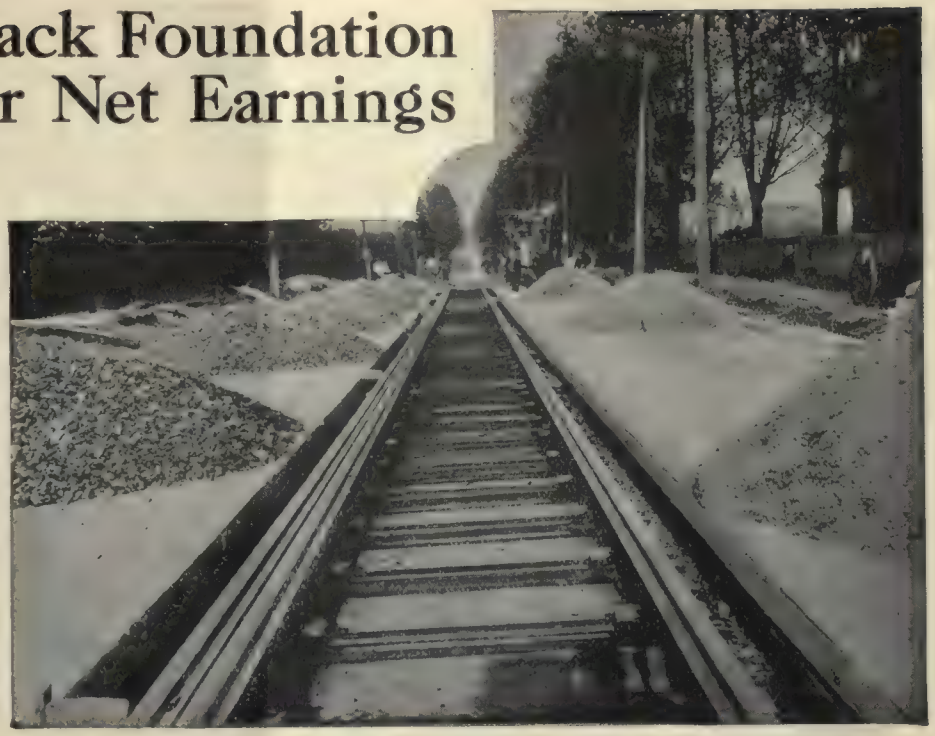
Nuttall Sleet Scrapers hook over the trolley wheel—can be attached instantly, and clean the wire thoroughly. Don't wait for a sleet storm—order *today*.

**R.D. NUTTALL COMPANY**

**PITTSBURGH PENNSYLVANIA**

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

# The Right Track Foundation Insures Better Net Earnings



his photograph shows the right ack foundation, Dayton Resilient ies embedded in concrete. Such foundation insures permanency reducing to a minimum some of e heaviest expenses of Street ailway Systems, viz., repairs to ack, paving and rolling stock.

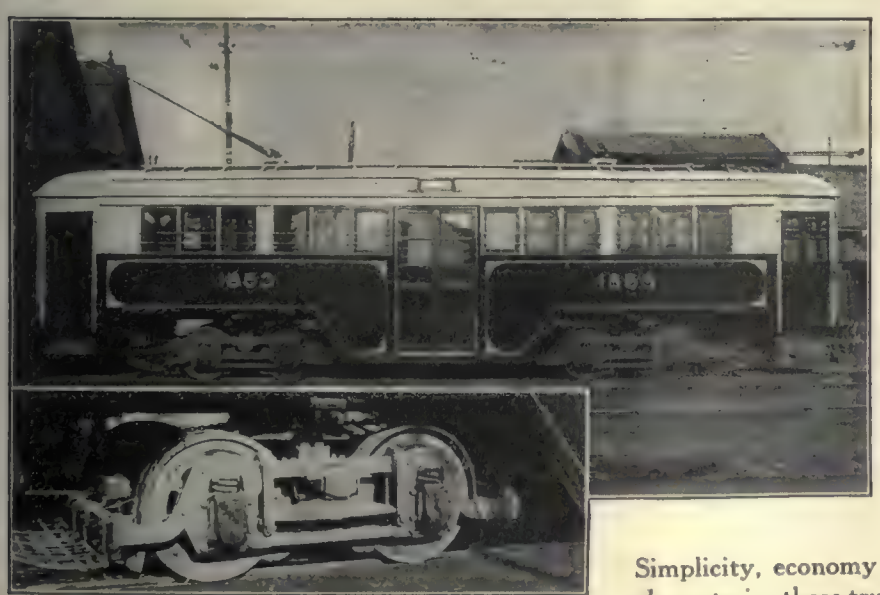
esiliency and shock absorption, built and made a part of the track foun- tion, insure permanency.

he facts that prove this are easy to derstand and easier to get. *Simply op us a line.*

The Dayton Mechanical Tie Co.
707 Commercial Building
DAYTON, OHIO

**DAYTON Resilient TIE**

## Baldwin Class "L" Trucks on Tokyo Municipal Electric Railway Cars



Type "L" Trucks on Tokyo Municipal Railway Cars

Where the clearance under the car body permits wheels of equal size, Baldwin Class "L" trucks give absolute satisfaction in city service. The side frames are of bar steel, arranged with the greater sectional dimension vertical to give maximum strength. The end frames are of angle iron. The motors are outside hung, permitting a short wheel base to be used.

Simplicity, economy and low cost of maintenance characterize these trucks. Full details upon request

THE BALDWIN LOCOMOTIVE WORKS
PHILADELPHIA, U. S. A.
Cable Address, "Baldwin, Philadelphia"
1241



# Quick Accurat Permanent

*A Record of Each Sale When the Sale is Made*

The sale of electric railway transportation strictly a retail business proposition and shou comply with those methods which have be found most successful in other lines of mercha dising.

The only safe method is to mechanically indica and record the amount of each sale in the pr ence of the purchaser at the time the sale is mad

Ohmer Fare Registers indicate and record t exact amount and class of fare paid at the tir it is paid. They apply to electric railroading t correct methods which have brought success countless retail merchants.

**OHMER FARE REGISTER COMPANY**
**Dayton, Ohio, U. S. A.**

# Your Passengers Will Enjoy Their Ride On
# Hale-Kilburn Seats

Especially Designed for
One Man Safety Cars



*Lightest Weight Stationary Steel Seat*

**Lightest**
**Strongest**
**Simplest**
**Neatest**



*Lightest Weight Walkover Steel Seat*

*No higher in price than others*
*Write for particulars*

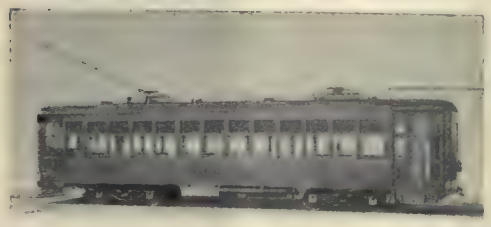
## Hale-Kilburn Company
**PHILADELPHIA**

| New York | Chicago | Richmond | Atlanta | San Francisco | Los Angeles |
|---|---|---|---|---|---|
| 30 Church St. | McCormick Bldg. | Mutual Bldg. | Candler Bldg. | 903 Monadnock Bldg. | 320 S. Pedro St. |

Fort Wayne Car



"Universal" Double-Truck Safety Car



Detroit Safety Car



# Given the Highest Endorsement

There is real justification for the high endorsement given St. Louis Quality cars by companies operating them.

Not only does every type from the biggest interurban railroad car, down the line through the city car, safety car, trackless trolley and the motor bus afford the latest development for efficient passenger transportation, but they also assure the highest quality construction throughout, comfort, beauty, lower maintenance and lower operating costs.

**Truly a combination which makes it important to investigate. Data on request.**

## St. Louis Car Company

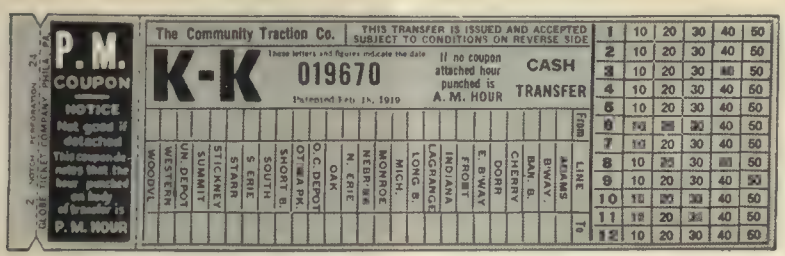
St. Louis, Mo.

*"The Birthplace of the Safety Car"*

GTC

GLOBE TICKET COMPANY PHILADELPHIA

GLOBE TICKET COMPANY NEW YORK




The symbol dated transfer is the safest and most economical.

Unused transfers can be turned back into stock at the end of the day, and used again.

With arbitrary symbols to represent the date, fraudulent use is almost impossible. The date symbols can be varied at will.

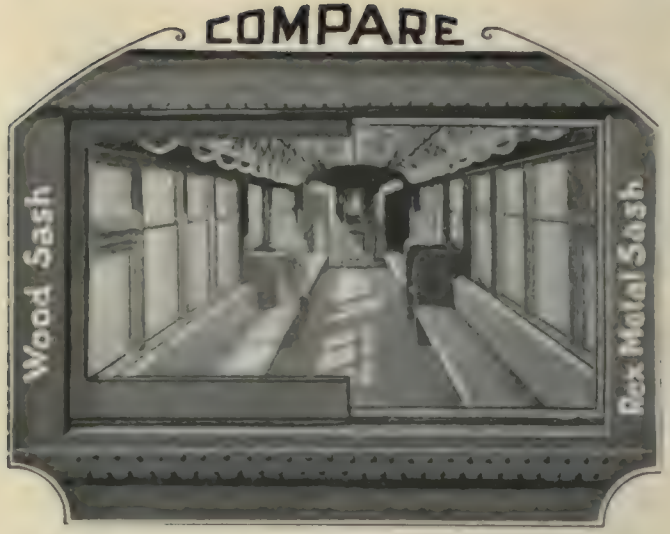
*If it's a ticket or check—we make it.*

## Globe Ticket Company 116 N. 12th St. Philadelphia, Pa.

*Specialists in Tickets and Checks Since 1873* Los Angeles New York San Francisco

SAN FRANCISCO GLOBE TICKET COMPANY

LOS ANGELES GLOBE TICKET COMPANY



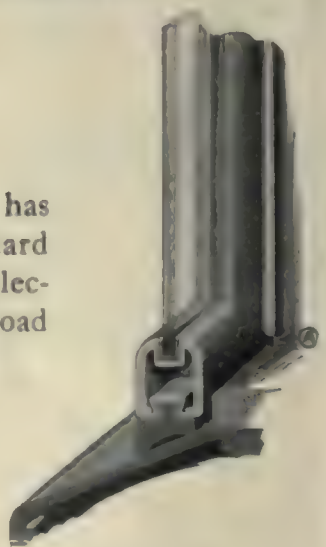



# LIGHT
## Thru The Window



The Oil Lamp, years ago, was discarded for Electricity to secure Better Light, increase safety and to cut Maintenance Costs.

**Rex METAL Sash**
AND WEATHERSTRIP



For the same reason, has been adopted as Standard Equipment by many Electric Traction and Railroad Companies.

**Write us for information regarding**
**COMPLETE WINDOW EQUIPMENT**

*All Metal Rollers*
*Ring Fixtures*
*Weather Strip*

**REX**

*Metal Sash*
*Locks and Lifts*
*Curtains*

*Manufactured by*

**The Curtain Supply Company**
Elkhart, Indiana

355 West Ontario St., Chicago, Ill
50 Church St., New York, N. Y.



# This Paper is a "Member *of the* A.B.P."

To you, this is a fact of especial significance, for it means that this publication is part of a concerted movement to raise the level of publishing practice, to assure better service to both subscribers and advertisers.

The "A.B.P." is built upon and revolves around the following set of standards—

## STANDARDS *of* PRACTICE

THE publisher of a business paper should dedicate his best efforts to the cause of Business and Social Service, and to this end should pledge himself—

1. To consider, first, the interests of the subscriber.
2. To subscribe to and work for truth and honesty in all departments.
3. To eliminate, in so far as possible, his personal opinions from his news columns, but to be a leader of thought in his editorial columns, and to make his criticisms constructive.
4. To refuse to publish "puffs," free reading notices or paid "write-ups"; to keep his reading columns independent of advertising considerations, and to measure all news by this standard: "Is it real news?"
5. To decline any advertisement which has a tendency to mislead or which does not conform to business integrity.
6. To solicit subscriptions and advertising solely upon the merits of the publication.
7. To supply advertisers with full information regarding character and extent of circulation statements, subject to proper and authentic verification.
8. To co-operate with all organizations and individuals engaged in creative advertising work.
9. To avoid unfair competition.
10. To determine what is the highest and largest function of the field which he serves, and then to strive in every legitimate way to promote that function.

Publications which have subscribed to these standards have earned the preferred consideration accorded them.

THE ASSOCIATED BUSINESS PAPERS, INC.
220 West 42nd St., New York

## J-P Products of interest to Electric Railways


NOARK Fuses


NOARK Fuse Clips CUTOUT BASES


NOARK Service and Underground Boxes

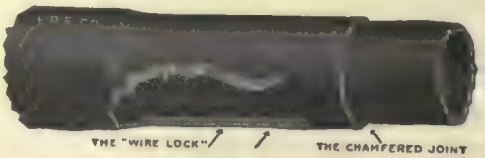

Railway and Mine hangers and insulators


J-P Molding Service [Contract Basis]


VULCABESTON Sheet and Rope Packing

JOHNS-PRATT CO. HARTFORD, CONN.

## ELRECO TUBULAR POLES




COMBINE

Lowest Cost — Lightest Weight
Least Maintenance — Greatest Adaptability

Catalog complete with engineering data sent on request.

ELECTRIC RAILWAY EQUIPMENT CO.
CINCINNATI, OHIO
New York City, 30 Church Street

TRADE ANDERSON MARK

*For dependable Line Material that will give you maximum service use*

*Send for Latest Quotations*
Main Office and Factory, Boston, Mass.

## AMELECTRIC PRODUCTS

AMERICAN ELECTRICAL WORKS — AMELECTRIC — Wires and Cables — PHILLIPSDALE, R.I.

Reg. U. S. Pat. Office

Incandescent Lamp Cord

BARE COPPER WIRE AND CABLE
TROLLEY WIRE
WEATHERPROOF WIRE AND CABLE
PAPER INSULATED UNDERGROUND CABLE
MAGNET WIRE

AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.

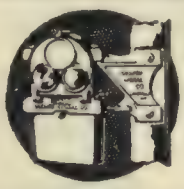
Boston, 176 Federal; Chicago, 112 W. Adams; Cincinnati, Traction Bldg.; New York, 100 E. 42nd St.

## Chapman
## Automatic Signals
Charles N. Wood Co., Boston



## AUTOMATIC SIGNALS
Highway Crossing Bells
Headway Recorders
Flasher Relays

NACHOD SIGNAL COMPANY, INC.
LOUISVILLE, KENTUCKY.



## ANACONDA TROLLEY WIRE

ANACONDA COPPER MINING COMPANY
Conway Building, Chicago, Ill.

THE AMERICAN BRASS COMPANY
General Offices: Waterbury, Conn.

Lapp Insulators
Lapp Insulator Co. Inc. LeRoy, N.Y.
Trade Mark

## PEIRCE
Railway Feeder Pins



A strong Forged Steel Pin designed for heavy duty. Their low cost permits their use over the entire system.



HUBBARD & COMPANY
PITTSBURGH — CHICAGO

## STANDARD

WIRES, CABLES AND CABLE ACCESSORIES
*Manufactured by* STANDARD UNDERGROUND CABLE CO.
Boston, New York, Philadelphia, Washington, Pittsburgh, Chicago, Detroit, St. Louis, San Francisco




WELDING CABLE
ELECTRICAL WIRES and CABLES
John A. Roebling's Sons Company, Trenton, N. J.

## THE SEARCHLIGHT SECTION

*will find* { The man / The position / The plant } *you want*

*Put your ad in the Searchlight*

## Shaw Lightning Arresters

*Standard in the Electric Industries for 35 years*

Henry M. Shaw
*150 Coit St., Irvington, Newark, N. J.*

# American Rail Bonds

CROWN
UNITED STATES
TWIN TERMINAL
SOLDER
TRIPLEX

Arc Weld and Flame Weld

*Send for new Rail Bond Book*

American Steel & Wire Company
CHICAGO
NEW YORK

"CARNEGIE"
for
WHEELS
AXLES
RAILS
CROSS TIES



Carnegie Steel Company
PITTSBURGH, PENNA.

We are prepared
to handle any high grade proposition where
VARNISHED CAMBRIC
Wires and Cables
are required.
When using *quality* Wires and Cables use *quality* Tapes
"MANSON" Tape. "OKONITE" Tape. "DUNDEE" Tapes.
THE OKONITE CO., Passaic, N. J.
Incorporated 1884

OKONITE
TRADE MARK

Sales Offices: New York—Atlanta—Pittsburgh—San Francisco
Agents: General Electric Co., Chicago
In Pittsburgh, Andrews Co., Boston, Mass.; The F. D. Lawrence Electric Co., Cincinnati, Ohio; Novelty Electric Co., Philadelphia, Pa.
Canadian Representatives: Engineering Materials Limited, Montreal

# High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS
COMPLETE LAYOUTS
IMPROVED ANTI-KICK BIG-HEEL SWITCHES
HARD CENTER AND MANGANESE CONSTRUCTION

New York Switch & Crossing Co.
Hoboken, N. J.

Cambria Forged Steel
Electric Car Axles
*To Meet Most Rigid Specifications*



Other products for the electrical field includes wheels, armat shafts, rails, spikes, track work, splice bars, bolts, tie pla tie rods, pole line material, sheets, magnet steel and gear blan

BETHLEHEM STEEL COMPANY, BETHLEHEM, P

BETHLEHEM

SPECIALISTS
in the
Design and Manufacture
of
*Standard—Insulated—and Compromise Rail Joints*

The Rail Joint Company
61 Broadway, New York City

Lorain Special Trackwork
Girder Rails

*Electrically Welded Joints*

THE LORAIN STEEL COMPANY
Johnstown, Pa.

*Sales Offices:*
Atlanta Chicago Cleveland New Yo
Philadelphia Pittsburgh
*Pacific Coast Representative:*
United States Steel Products Company
Los Angeles Portland San Francisco Seatt
*Export Representative:*
United States Steel Products Company, New York, N. Y.

# THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

**Builders since 1868 of Water Tube Boilers of continuing reliability**

BRANCH OFFICES

BOSTON, 49 Federal Street
PHILADELPHIA, Packard Building
PITTSBURGH, Farmers Deposit Bank Building
CLEVELAND, Guardian Building
CHICAGO, Marquette Building
CINCINNATI, Traction Building
ATLANTA, Candler Building
PHOENIX, ARIZ., Heard Building
DALLAS, TEX., 2001 Magnolia Building
HONOLULU, H. T., Castle & Cooke Building
PORTLAND, ORE., 805 Gasco Building

WORKS

Bayonne, N. J.
Barberton, Ohio

**Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893**

BRANCH OFFICES

DETROIT, Ford Building
NEW ORLEANS, 521-5 Baronne Street
HOUSTON, TEXAS, Southern Pacific Building
DENVER, 435 Seventeenth Street
SALT LAKE CITY, 405-6 Kearns Building
SAN FRANCISCO, Sheldon Building
LOS ANGELES, 404-6 Central Building
SEATTLE, L. C. Smith Building
HAVANA, CUBA, Calle de Aguiar 104
SAN JUAN, PORTO RICO, Royal Bank Building

B. A. HEGEMAN, Jr., President — C. C. CASTLE, First Vice-President
H. A. HEGEMAN, Vice-Pres. and Treas. — F. T. SARGENT, Secretary
W. C. PETERS, Manager Sales and Engineering

## National Railway Appliance Co.

Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., New York
Munsey Bldg., Washington, D. C. — 100 Boylston St., Boston, Mass.
Hegeman-Castle Corporation, Railway Exchange Building, Chicago.

RAILWAY SUPPLIES

Tool Steel Gears and Pinions
Bell Locked Fare Box and Change Maker
The Aluminum Field Coils
Truck and Car Repair Parts
Cutler-Hammer Electric Heaters
Pittsburgh Forge & Iron Co.'s Products
Genesco Paint Oils
E. Z. Car Control Corporation's Safety Devices
Garland Ventilators
Flaxlinum Insulation
Yellow Coach Mfg. Co.'s Single and Double Deck Busses
Economy Electric Devices Co.'s Power Saving and Inspection Meters
Anglo-American Varnish Co.'s Varnishes, Enamels, etc.
Gilmer Multiple Safety Step Treads
National Hand Holds
Ft. Pitt Spring & Mfg. Co.'s Springs
Turnstile Car Corporation's Turnstiles
Anderson Slack Adjusters
Feasible Drop Brake Staffs
Dunham Hopper Door Device

THE WORLD'S STANDARD

## "IRVINGTON"

Black and Yellow
Varnished Silk, Varnished Cambric, Varnished Paper

Irr-O-Slot Insulation Flexible Varnished Tubing
Insulating Varnishes and Compounds

## Irvington Varnish & Insulator Co.

Irvington, N. J.

*Sales Representatives in the Principal Cities*

## RAILWAY UTILITY COMPANY

CAR COMFORT WITH
UTILITY
HEATERS
REGULATORS
VENTILATORS

141-151 West 22d St., Chicago, Ill. — *Write for Catalogue* — 1328 Broadway, New York, N. Y.

## ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.

Electrical Machinery, Steam Turbines, Steam Engines, Condensers, Gas and Oil Engines, Air Compressors, Air Brakes

## RAMAPO AJAX CORPORATION

Ramapo Automatic Return Switch Stands for Passing Sidings

RACOR

RACOR Tee Rail Special Work

Manganese Construction

GENERAL OFFICES: HILBURN, NEW YORK

Chicago — New York — Superior, Wis. — Niagara Falls, N. Y.

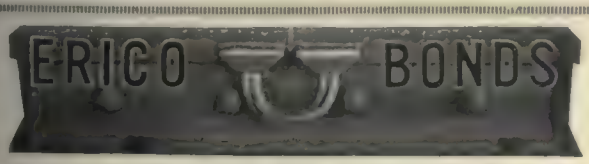
Canadian Ramapo Iron Works, Ltd., Niagara Falls, Ont.

## ALUMINO-THERMIC JOINTS

FERALITE

New and independent process. No inserts needed. Up-to-date and economical.

Alumino-Thermic Corp., Roselle Park, N. J.




THE ELECTRIC RAILWAY IMPROVEMENT CO.
CLEVELAND, OHIO

**A Single Segment or a Complete Commutator**

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut

## ECONOMIZERS

reduce fuel costs by making use of waste exhaust gases to preheat the boiler feed. Patented construction proven by 20 years of service.

# FOSTER

## SUPERHEATERS

improve engine, turbine and boiler economy by enabling a given amount of steam to do more work. Over 10,000 installations in stationary power plants.

POWER SPECIALTY CO., Boston, Phila., Pitts., Detroit, Kans. City, Chicago, San Fran., Los Angeles, Boulder, Dallas, London 111 Broadway, NEW YORK

TULC
A LUBRICANT

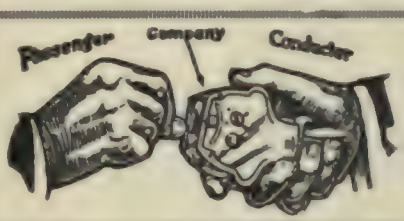
We make a specialty of
ELECTRIC RAILWAY LUBRICATION
We solicit a test of TULC on your equipment
The Universal Lubricating Co.
Cleveland, Ohio
Tulc, Inc., Eastern Representative,
1617 Gotham National Bank Bldg., New York City

Play for safety—
plus resiliency—
plus long life
By specifying
FORT PITT SPRINGS
FORT PITT SPRING & MFG. CO.
Pittsburgh, Pa.



STOP
"OSKELITE"
The Stop Light for street cars. Operates from brake system. Details on request.
The Oskel Equipment Co.
940 McCormick Bldg., Chicago, Ill.

PANELYTE
HEADLININGS
THE PANELYTE COMPANY, Trenton, N. J.




Direct Automatic Registration By the Passengers
Rooke Automatic Register Co.
Providence, R. I.

PS HEATERS
Car Heating and Ventilation
are two of the winter problems that you must settle without delay. We can show you how to take care of both with one equipment. Now is the time to get your cars ready for next winter. Write for details.
The Peter Smith Heater Company
6209 Hamilton Ave., Detroit, Mich.

Fresh Air Without the Slightest Draft

There's a difference!.....patronage proves it! Passengers dodge drafts. Profits dodge cars and buses that permit them.

Winter's at the door! Prepare now to insure comfortable passengers and comfortable profits! N-L Ventilators completely change foul air for fresh many times every hour, at the same time preventing absolutely the entrance of snow, rain, dust, WEATHER.

*Write for our booklet, "Superior Ventilation," for complete details and information*



Type "A" for cars having small radius. One of a variety for street and bus use

The Nichols-Lintern Co., 7960 Lorain Ave., Cleveland, Ohio
Canadian Rep.: Railway & Power Eng. Corp., Ltd., Toronto, Ontario



*Gets Every Fare*
PEREY TURNSTILES or PASSIMETERS
Use them in your Prepayment Areas and Street Cars
Perey Manufacturing Co., Inc.
101 Park Avenue, New York City

HASKELITE
Moulded roofs are furnished in sections best suited to the car builder. They increase the strength, reduce weight and labor costs of your cars.
Plymetl girder panels armour the sides against blows. They weigh less than 16 gauge steel, reduce vibration and rumbling.
Send for blueprint booklet
HASKELITE MANUFACTURING CORPORATION
133 W. Washington Street, Chicago, Ill.

75% of the electric railways use
B-V Punches
*Send for Catalog*



BONNEY-VEHSLAGE TOOL CO., Newark, N. J.

Only reliable products can be continuously advertised.




Type R-11
Double Register

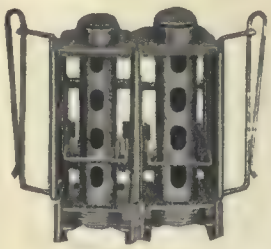
## International Registers

Made in single and double types to meet requirements of service. For hand or foot, mechanical or electric operation. Counters, car fittings, conductors' punches.

Exclusive selling agents for HEEREN ENAMEL BADGES.

**The International Register Co.**
15 South Throop Street, Chicago, Illinois

# JOHNSON Universal Changer



### Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

### Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

**JOHNSON FARE BOX COMPANY**
Ravenswood, Chicago, Ill.

THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



No. 478E

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.



The Zone System of Fares is Successfully Collected with the Aid of

# CLEVELAND FARE BOXES

*Let Us Give You Particulars*

**The Cleveland Fare Box Co.**
Cleveland, Ohio

Canadian Cleveland Fare Box Co., Ltd.,
Preston, Ont.

Coin Counting and Sorting Machines. Change Carriers

## Heywood-Wakefield

**CAR SEATS**

of pressed Steel for all Classes of Passenger Service. Rattan for covering seats and for snow sweepers.

**HEYWOOD-WAKEFIELD CO.**
Factory at Wakefield, Mass.
Offices at New York, Chicago, San Francisco

For detailed description — see — CAR BUILDERS CYCLOPEDIA 1922 Edition



## McGuire-Cummings Manufacturing Co.

**General Offices:**
**111 W. Monroe St., Chicago, Ill.**

**Street Cars**
**Trucks**
**Snow Sweepers**



100 New Users in the Last Nine Months
**KASS SAFETY TREADS**
**HIGH**
in efficiency and lasting qualities
**LOW**
in weight, initial and upkeep costs
**Morton Manufacturing Co., Chicago**

**SAMSON SPOT WATERPROOFED TROLLEY CORD**



Trade Mark Reg. U. S. Pat. Off.
Made of extra quality stock firmly braided and smoothly finished.
Carefully inspected and guaranteed free from flaws.
Samples and information gladly sent.
**SAMSON CORDAGE WORKS, BOSTON, MASS.**

For better Axles Specify
**"VALSCO"**
**HEAT TREATED CAR AXLES**
**LACLEDE STEEL CO.**
Arcade Bldg. St. Louis, Mo.

**PROVIDENCE FENDERS** **H-B LIFE GUARDS**

**The Consolidated Car Fender Co., Providence, R. I.**
**Wendell & MacDuffie Co., 110 E. 42nd St., New York**
General Sales Agents



# THE RUSH HOUR

holds no terrors for you or your passengers if your rolling stock keeps rolling...

## AJAX BULL BEARING ALLOY

will keep bearings and passengers cool. Stays on the job for a long time.

**The Ajax Metal Company**
ESTABLISHED 1880
PHILADELPHIA
New York Chicago Boston Cleveland

# BRAKE SHOES

## AERA Standards Brake Heads



Diamond "S" Steel Back and Lug Shoes best for all equipment.

Manufactured and sold under U. S. Patent and Registered Trade Mark.

**American Brake Shoe and Foundry Co.**
**30 Church Street, New York**
332 So. Michigan Ave., Chicago

*Youire having brush trouble*

CORRECT IT
USE LE CARBONE CARBON BRUSHES

*They talk for themselves*

COST MORE PER BRUSH
COST LESS PER CAR MILE

**W. J. Jeandron**
345 Madison Avenue, New York
Pittsburgh Office: 634 Wabash Bldg.
Chicago Office: 1657 Monadnock Block
San Francisco Office: 525 Market Street
Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal and Toronto

"Tool Steel"

HELICALS

are just as superior in quality as

"Tool Steel"

STUBS

Tool Steel Quality

The Tool Steel Gear and Pinion Co.
CINCINNATI, O.

Helical gears licensed under patent May 30th, 1922

# BUY BRUSHES
## MADE IN THE U. S. A.

USG

CARBON—GRAPHITE—METAL
MOTOR AND GENERATOR BRUSHES

**Meet every requirement**

Grade recommendations, based upon your individual requirements and operating conditions, made by experienced Brush Engineers, guarantee long life and perfect service.

*Write for Catalog B-3.*

THE UNITED STATES GRAPHITE COMPANY
SAGINAW, MICHIGAN, U. S. A.





*"Differential Two-Car Train. Trailer dumping load clear of trench."*

# DIFFERENTIAL CARS
**Standard on Fifty Railways for**

| | |
|---|---|
| Track Maintenance | Track Construction |
| Ash Disposal | Hauling Crossties |
| Placing Ballast | Disposal of Waste |
| Coal Hauling | Snow Disposal |

Concrete Materials to the Job
Excavated Material to the Dump

***For Economy***

THE CLARK CONCRETE BREAKER
THE DIFFERENTIAL BOTTOM DUMP CAR
THE DIFFERENTIAL COMBINATION CAR-WHEEL TRUCK and TRACTOR

THE DIFFERENTIAL STEEL CAR CO.
Findlay, Ohio, U. S. A.



# Waterproofed Trolley Cord




Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

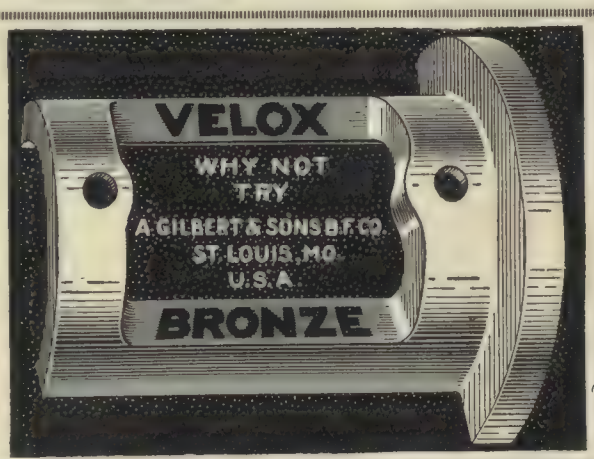
**FOR POSITIVE SATISFACTION ORDER SILVER LAKE**

If you are not familiar with the quality you will be surprised at its ENDURANCE and ECONOMY.

***Sold by Net Weights and Full Lengths***

SILVER LAKE COMPANY
*Manufacturers of bell, signal and other cords.*
Newtonville, Massachusetts







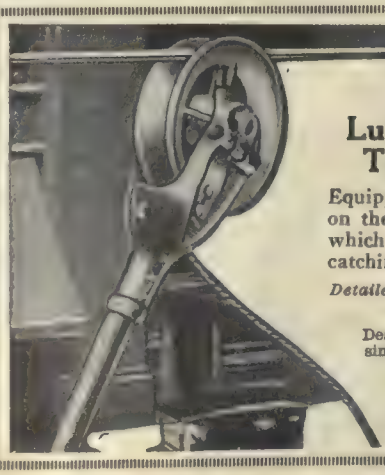

# The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.





# M-J No. 10 Lubricated Type Trolley Wheel

Equipped in our No. 6 harp on the bottle-shape principle which prevents fouling or catching overhead lines.

*Detailed information and prices on request.*

Designed for high speed, simplicity and economy.

More-Jones Brass & Metal Co.
St. Louis, Mo.

# SEARCHLIGHT SECTION

## USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED RATE PER WORD

*Positions Wanted*, 4 cents a word, minimum 75 cents an insertion, payable in advance.

*Positions Vacant* and all other classifications, 8 cents a word, minimum charge $2.00.

*Proposals*, 40 cents a line an insertion.

INFORMATION

*Box Numbers* in care of any of our offices count 10 words additional in undisplayed ads.

*Discount* of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED RATE PER INCH

1 to 2 inches . . . $4.50 an inch
3 to 7 inches . . . 4.40 an inch
8 to 14 inches . . . 4.10 an inch

Rates for larger spaces or yearly rates on request.

To ascertain inch is measured vertically on one column, 3 columns—30 inches—to a page.

EFJ

### POSITIONS WANTED

EXECUTIVE. Urban and interurban. Wide successful experience in all departments of construction and operation. PW-740, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

EXPERIENCED operating man, now employed, desires change. Technical graduate, forty-one years of age, sixteen years' experience covering all branches of electric railway operation, eight years in the transportation end, with large railway company in the east. Best of references from men high in electric railway field. Desire to connect with company where ability can be demonstrated and where there is opportunity for advancement. PW-747, Electric Railway Journal, 10th Ave. at 36th St., New York.

WANTED

**SEVERAL RAILS**

Second Hand

Lorain Steel Company's section 90, No. 317.

ROME RAILWAY & LIGHT COMPANY
Rome, Georgia

For Sale—Built in 1920

**2—Kuhlman Semi-Steel Interurban Cars, Passenger, Smoker and Baggage.**

Length 54 ft. 7¼ in.; width 8-ft. 6-in.
Brill 27 MCB 2 Trucks.
4 G. E. 203 motors. Complete.

ELECTRIC EQUIPMENT CO
Commonwealth Bldg., Philadelphia, Pa.

FOR SALE

100 doz., No. 778; 75 doz., No. 786; 50 doz., No. 986 Headlight Globes Macbeth brand. Absolutely new. Price $2.50 per dozen.

C. F. BULOTTI MACHINERY CO.
67-71 Main St., San Francisco, Cal.

FOR SALE

**New Root Snow Scrapers**

16 Sets Air Operated.

TRANSIT EQUIPMENT CO.
*Cars—Motors*
501 Fifth Ave., New York

**Relaying Rails**
NEW RAILS - ACCESSORIES

See our full page announcement on page 27.

1 Ton or 1000

LBFOSTER CO

PITTSBURGH, PA. NEW YORK CITY
JERSEY CITY - PHILADELPHIA - HAMILTON, O.

# FOR SALE Standard Gauge Electric Railway Equipment

1—Parlor Chair Car, built by American Car Company, length 48 ft.—seating capacity 40—fully equipped air brakes, electric heating system. Brill standard double trucks 65-hp. motors. Type M Controller.

6—Interurban Passenger Cars, built by American Car Company, length of cars 40-ft., seating capacity 50, fully equipped air brakes. Electrical equipment 4 G E —67—40 hp. motors and K-6 controllers. Smith heaters and Brill standard double trucks.

1—Express Car built by American Car Company length 50 ft., equipped with air brakes, stove heat. Brill standard double trucks. Electrical equipment 4 G E —67—40 hp. motor and K-28 controller.

1—Line Car, 24-ft. long. Electrical equipment consists of 2 G E —1000—35-hp. motors and K-10 controller.

Cars in splendid condition, finished in both rattan and plush. For quick sale, we offer these Cars at $3000 each, f.o.b. cars. Write at once for detailed specifications. Located in Chicago District. Inspection invited.

**HYMAN-MICHAELS COMPANY**

*Rails, Locomotives and Cars*

Main Office—CHICAGO—Peoples Gas Bldg.

District Offices: New York, Pittsburgh, St. Louis, San Francisco

**NEW GEARS, PINIONS AND GEAR CASES FOR SALE**

GE-1000 Motor:
173 15 tooth pinions
107 69 tooth gears
16 Sheet iron gear cases

GE-800 Motor:
4 malleable gear cases and 3 bottom halves

FS-740 Electric Railway Journal
10th Ave. at 36th St. New York City

# RAILS

**New or Relayers**

We Buy or Sell

**ZELNICKER IN ST. LOUIS**

# SOME ONE WANTS TO BUY

the equipment or machinery that you are not using.

This may be occupying valuable space, collecting dust, rust and hard knocks, in your shops and yards.

**SELL IT BEFORE DEPRECIATION SCRAPS IT**

THE SEARCHLIGHT SECTION
IS HELPING OTHERS

*—LET IT HELP YOU ALSO*

0128

FOR SALE

# One-Man Double End Safety Cars



*Selections may be made from a lot of two hundred. Cars are three years old and in first-class condition.*

**The Department of Street Railways, City of Detroit, Mich.,** offers for sale any part of Two Hundred Single-Truck, Double-End Safety Cars, for Standard Gauge Track, equipped with air-operated Snow Scrapers, air-operated "R10" Registers, headlinings, center lighting with opal shades, electric heat, Utility Regulators, Nichols-Lintern tail lights, and Ohio Brass Trolley stands. Westinghouse 508 and General Electric 264 Motors. Westinghouse DH-16 and General Electric CP-27 Air Compressors. 26-in. Steel Wheels. Standard Safety Car Devices Co. equipment. Cars are of Standard Safety Car dimensions, and weigh approximately 17,000 pounds.

Bodies and Trucks were built by the J. G. Brill Car Co., St. Louis Car Co., Osgood-Bradley Car Co., and McGuire-Cummings Mfg. Co., and purchaser may select any of these type Cars.

Cars may be inspected by calling at the Department of Street Railways, Detroit, Michigan.

Bids are solicited for any part of the above offering, f.o.b. flat cars, Detroit, Michigan, and these may be directed to Frank Meyer, Jr., Purchasing Agent, Department of Street Railways, Administration Building, St. Jean & Shoemaker Aves., Detroit, Michigan.

**Bids will be opened on Monday, December 8th, at 11:00 A. M.,**
at which time same will be given consideration.

If interested in the purchase of the above kindly get in touch with the Department of Street Railways before date that bids are to be opened, for information relative to submitting formal bid, etc.

# WHAT AND WHERE TO BUY

**Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue**

**Advertising, Street Car**
Collier, Inc., Barron G.

**Air Receivers & Aftercoolers**
Ingersoll-Rand Co.

**Anchors, Guy**
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

**Armature Shop Tools**
Elec. Service Supplies Co.

**Automatic Return Switch Stands**
Ramapo Ajax Corp.

**Automatic Safety Switch Stands**
Ramapo Ajax Corp.

**Axles**
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Johnson & Co., J. R.
Laclede Steel Co.
St. Louis Car Co.
Westinghouse E. & M. Co.

**Babbitt Metal**
Ajax Metal Company

**Badges and Buttons**
Elec. Service Supplies Co.
International Register Co., The

**Barges Steel**
American Bridge Co.

**Batteries, Dry**
National Carbon Co.

**Bearings and Bearing Metals**
Ajax Metal Company
Bemis Car Truck Co.
Brill Co., J. G., The
General Electric Co.
Gilbert & Sons B. F. Co., A.
More-Jones Brass & Metal Co.
St. Louis Car Co.
Westinghouse E. & M. Co.

**Bearings, Center and Roller Side**
Baldwin Locomotive Wks.
Stucki Co., A.

**Bells and Gongs**
Brill Co., The J. G.
Consolidated Car Heat. Co.
Elec. Service Supplies Co.
St. Louis Car Co.

**Bearings, Roller**
Norma Hoffman Bearings Corp.

**Boilers**
Babcock & Wilcox Co.

**Bonding Apparatus**
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Track-work Co.

**Bonds, Rail**
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse E. & M. Co.

**Book Publishers**
McGraw-Hill Book Co.

**Boxes, Switch**
Johns-Pratt Co.

**Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)**
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

**Brake Adjusters**
Brill Co., The J. G.
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.

**Brake Shoes**
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.

**Brakes, Brake Systems and Brake Parts**
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
General Electric Co.
National Brake Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.

**Bridges, Steel**
American Bridge Co.

**Brushes, Carbon**
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
National Carbon Co.
U. S. Graphite Co.
Westinghouse E. & M. Co.

**Brushes, Graphite**
National Carbon Co.
U. S. Graphite Co.

**Brushes, Wire, Pneumatic**
Ingersoll-Rand Co.

**Buildings, Steel**
American Bridge Co.

**Buses, Motor**
Brill Co., The J. G.
International Motor Co.
New York Transportation Co.
Pierce Arrow Motor Car Co.
St. Louis Car Co.

**Bushings, Case Hardened and Manganese**
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.

**Cables. (See Wires and Cables)**

**Cambric Tapes, Yellow and Black Varnish**
Acme Wire Co.
Irvington Varnish & Ins. Co.

**Carbon Brushes (See Brushes, Carbon)**

**Cars, Dump**
Brill Co., J. G., The
Differential Steel Car Co.
St. Louis Car Co.

**Car Lighting Fixtures**
Elec. Service Supplies Co.

**Car Panel Safety Switches**
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.

**Cars, Passenger, Freight, Express, etc.**
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

**Cars, Gas, Rail**
Brill Co., J. G., The
St. Louis Car Co.

**Cars, Second Hand**
Electric Equipment Co.
Transit Equipment Co.

**Cars, Self-Propelled**
Brill Co., J. G., The
General Electric Co.

**Car Wheels, Rolled Steel**
Bethlehem Steel Co.

**Castings, Brass, Composition or Copper**
Ajax Metal Company
Anderson Mfg. Co., A. & J. M.
More-Jones Brass & Metal Co.

**Castings, Gray Iron and Steel**
Bemis Car Truck Co.
Fort Pitt Steel Castings Co.
St. Louis Car Co.

**Castings, Malleable and Brass**
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Fort Pitt Steel Castings Co.
St. Louis Car Co.

**Catchers and Retrievers, Trolley**
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

**Catenary Construction**
Archbold-Brady Co.

**Ceiling, Car**
Pantasote Co., Inc.

**Ceilings, Plywood, Panels**
Haskelite Mfg. Co.

**Change Carriers**
Cleveland Fare Box Co.

**Circuit-Breakers**
Anderson, A. & J. M. Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Clamps and Connectors for Wires and Cables**
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

**Cleaners and Scrapers Track (See also Snow-Plows, Sweepers and Brooms)**
Brill Co., The J. G.
St. Louis Car Co.

**Clusters and Sockets**
General Electric Co.

**Coal and Ash Handling (See Conveying and Hoisting Machinery)**

**Coil Banding and Winding Machines**
Elec. Service Supplies Co.

**Coils Armature and Field**
General Electric Co.
Westinghouse E. & M. Co.

**Coils, Choke and Kicking**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

**Coin Counting Machines**
Cleveland Fare Box Co.
Intern'l Register Co.
Johnson Fare Box Co.

**Coin Sorting Machines**
Cleveland Fare Box Co.

**Coin Wrappers**
Cleveland Fare Box Co.

**Commutator Slotters**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co

**Commutator Truing Devices**
General Electric Co.

**Commutators or Parts**
Cameron Elec'l Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Compressors, Air**
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.

**Compressors, Air Portable**
Ingersoll-Rand Co.

**Concrete Reinforcing Bars**
Laclede Steel Co.

**Condensor Papers**
Irvington Varnish & Ins. Co

**Condensers**
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.

**Connectors, Solderless**
Frankel Connector Co.
Westinghouse E. & M. Co.

**Connectors, Trailer Car**
Consolidated Car Heat. Co.
Elec. Service Supplies Co.
Ohio Brass Co.

**Controllers or Parts**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Controller Regulators**
Elec. Service Supplies Co.

**Controlling Systems**
General Electric Co.
Westinghouse E. & M. Co.

**Converters, Rotary**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Conveying Machinery**
American Bridge Co.

**Copper Wire**
Anaconda Copper Mining Co.

**Cord, Bell, Trolley, Register**
Brill Co., The J. G.
Elec. Service Supplies Co.
Internat'l Register Co., The
Roebling's Sons Co., John A.
St. Louis Car Co.
Samson Cordage Works
Silver Lake Co.

**Cord Connectors and Couplers**
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

**Couplers Car**
Brill Co., The J. G.
Ohio Brass Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.

**Cross Arms (See Brackets)**

**Crossing Foundations**
International Steel Tie Co

**Crossing, Frog & Switch**
Ramapo Ajax Corp.

**Crossing, Manganese**
Bethlehem Steel Co.
Ramapo Ajax Corp.

**Crossings**
Ramapo Ajax Corp.

**Crossings, Track (See Track, Special Work)**

**Crossings, Trolley**
Ohio Brass Co.

**Curtains & Curtain Fixtures**
Brill Co., The J. G.
Curtain Supply Co
Elec. Service Supplies Co.
Morton Mfg. Co.
Pantasote Co., Inc.
St. Louis Car Co.

**Dealer's Machinery**
Elec. Equipment Co.
Hyman-Michaels Co.
Transit Equipment Co.

**Derailing Devices (See also Track Work)**

**Derailing Switches**
Ramapo Ajax Corp.

**Destination Signs**
Elec. Service Supplies Co.

**Detective Service**
Wish Service, P. Edward

**Door Operating Devices**
Brill Co., The J. G.
Consolidated Car Heat. Co.
General Electric Co
Nat'l Pneumatic Co., Inc
St. Louis Car Co.

**Doors & Door Fixtures**
Brill Co., The J. G.
Consolidated Car Heat. Co
General Electric Co.
Morton Mfg. Co.

**Doors, Folding Vestibule**
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.

**Drills, Rock**
Ingersoll Rand Co.

**Drills, Track**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ingersoll-Rand Co.
Ohio Brass Co.

**Dryers, Sand**
Elec. Service Supplies Co

**Ears**
Ohio Brass Co.

**Economizers**
Power Specialty Co.

**Electrical Wires and Cables**
Amer. Electrical Works
Amer. Steel & Wire Co.
Roebling's Sons & Co., J. A.

**Electric Grinders**
Railway Track-work Co.
Western Electric Co.

**Electric Transmission Towers**
American Bridge Co.

**Electrodes, Carbon**
Railway Track-work Co.

**Electrodes, Steel**
Railway Track-work Co

**Engineers, Consulting, Contracting and Operating**
Allison & Co., J. S.
Archbold-Brady Co.
Beeler, John A.
Bibbins, J. Rowland
Buchanan & Layng Corp.
Bureau of Commercial Economics Inc
Day & Zimmerman, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelly-Cooke Co.
Ong, Joe R
Railway Audit & Inspection Co.
Richey, Albert S.
Robinson & Co., Dwight P.
Sanderson & Porter
Stevens & Wood
Stone & Webster
White Eng. Corp., The J. G.

**Engineering**
Equipment Engineering Co.

**Engines, Gas, Oil or Steam**
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.

**Fare Boxes**
Cleveland Fare Box Co.
Johnson Fare Box Co.
Nat'l Ry. Appliance Co.
Ohmer Fare Register Co.

**Fare Registers**
Ohmer Fare Register Co.

**Fences, Woven Wire and Fence Posts**
Acme Wire Co
Amer. Steel & Wire Co.

**Fenders and Wheel Guards**
Brill Co., The J. G.
Consolidated Car Fender Co.
Elec. Service Supplies Co.
St. Louis Car Co.

**Fibre and Fibre Tubing**
Westinghouse E. & M. Co.

**Field Coils (See Coils)**

**Floodlights**
Elec. Service Supplies Co.

**Forgings**
Brill Co., J. G., The

**Frogs & Crossings, Tee Rail**
Bethlehem Steel Co.
Ramapo Ajax Corp.

**Frogs, Track (See Track Work)**

**Frogs, Trolley**
Ohio Brass Co.

**Furnaces, Electric Steel Melting**
American Bridge Co.

**Fuses and Fuse Boxes**
Consolidated Car Heat. Co.
General Electric Co.
Westinghouse E. & M. Co

**Fuses, Cartridge, Non-Refillable & High Voltage**
Johns-Pratt Co.

**Fuses, Refillable**
General Electric Co.
Johns-Manville, Inc.
Johns-Pratt Co.

**Gaskets**
Westinghouse Tr. Br. Co.

**Gas Producers**
Westinghouse E. & M. Co.

**Gas-Electric Cars**
General Elec Co
Westinghouse E. & M. Co.

**Gates, Car**
Brill Co., The J. G
St. Louis Car Co.

**Gear Blanks**
Bethlehem Steel Co.
Brill Co., J. G., The

**Gear Cases**
Chillingworth Mfg. Co.
Elec. Service Supplies Co
Westinghouse E. & M. Co

**Gears and Pinions**
Bemis Car Truck Co.
Bethlehem Steel Co.
Elec. Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

**Generating Sets, Gas-Electric**
General Electric Co.

**Generators**
Allis-Chalmers Mfg Co
General Electric Co.
Westinghouse E. & M. Co.

**Girder Rails**
Bethlehem Steel Co.
Lorain Steel Co

**Gong (See Bells and Gongs)**

**Greases (See Lubricants)**

**Grinders and Grind Supplies**
Indianapolis Switch & Frog Co
Railway Track-work Co.

**Grinders, Portable**
Railway Track-work Co.

**Grinders, Portable Electric**
Railway Track-work Co.

**Grinding Belts and Wheels**
Railway Track-work Co.

**Guard Rail Clamps**
Ramapo Ajax Corp.

**Guard Rails, Tee Rail & Manganese**
Ramapo Ajax Corp.

**Guards, Trolley**
Elec. Service Supplies Co
Ohio Brass Co.

**Hammers, Pneumatic**
Ingersoll-Rand Co.

**Harps, Trolley**
Elec. Service Supplies Co
More-Jones Brass Metal Co.
Nuttall Co., R. D.
Star Brass Works

**Headlights**
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.

**Headlining**
Haskelite Mfg. Co.
Pantasote Co
Pantasote Co., Inc.

**Heaters, Car (Electric)**
Consolidated Car Heat. Co.
Gold Car Heat. & Ltg. Co.
Nat'l Ry. Appliance Co.
Smith Heater Co., Peter

**Heaters, Car, Hot Air and Water**
Elec. Service Supplies Co.
Smith Heater Co., Peter

**Heaters for Special Purposes**
Power Specialty Co.

**Helmets—Welding**
Railway Track-work Co

**Hoisting Machinery**
American Bridge Co.

**Hoists, Portable**
Ingersoll-Rand Co

**Hydraulic Machinery**
Allis-Chalmers Mfg. Co.

**Indicating Signals**
Oskel Equipment Co.

**Instruments Measuring, Testing and Recording**
Elec. Service Supplies Co.
General Electric Co.
Johns-Pratt Co.
Westinghouse E. & M. Co.




*Ingersoll-Rand Paving Breakers tearing up track foundation operated from I-R Electric Driven Portable Air Compressor.*

# A dozen times faster

## The Compressed Air Way Saves Time and Money

Ingersoll-Rand Portable Air Compressors and Tools finish up many jobs in a fraction of the time required by hand methods.

Pneumatic "Paving Breakers" save more than 50% in time and labor over hand methods, when breaking out pavement shoulders, heavy foundation, etc.

Pneumatic Tie Tampers enable four men to tamp more track and do it better than twelve to sixteen men using hand methods.

Other air tools are also used to save money on various jobs, making the portable compressor outfit a most important factor in reducing track costs. Ask for complete information on the savings made with portable air power units.

**Ingersoll-Rand Company**
**11 Broadway, New York**
*Offices in the Principal Cities the World Over*
**For Canada, refer Canadian Ingersoll-Rand Co., Limited**
**260 St. James Street, Montreal, Quebec.**

# Ingersoll-Rand

**Insulating Cloth, Paper and Tape**
General Electric Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Stand. Underground Cable Co.
Westinghouse E. & M. Co.

**Insulating, Silk & Varnish**
Irvington Varnish & Ins. Co.

**Insulation (See also Paints)**
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Westinghouse E. & M. Co.

**Insulation Slots**
Irvington Varnish & Ins. Co.

**Insulators (See also Line Materials)**
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse E. & M. Co.

**Insulator Pins**
Elec. Service Supplies Co.
Hubbard & Co.

**Insulators, High Voltage**
Lapp Insulator Co., Inc.

**Jacks (See also Cranes, Hoists and Lifts)**
Elec. Service Supplies Co.

**Joints, Rail**
(See Rail Joints)

**Journal Boxes**
Bemis Car Truck Co.
Brill Co., J. G.
Fort Pitt Steel Castings Co
St. Louis Car Co.

**Junction Boxes**
Std. Underground Cable Co.

**Lamps, Guards and Fixtures**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

**Lamps, Arc & Incandescent**
(See also Headlights)
General Electric Co.
Westinghouse E. & M. Co.

**Lamps, Signal and Marker**
Nichols-Lintern Co.
Ohio Brass Co.

**Lanterns, Classification**
Nichols-Lintern Co.

**Lightning Protection**
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Shaw, Henry M.
Westinghouse E. & M. Co.

**Line Material (See also Brackets, Insulators, Wires, etc.)**
Archbold-Brady Co.
Electric Ry. Equipment Co.
Elec. Service Sup. Co.
General Electric Co.
Hubbard & Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

**Locomotives, Electric**
Baldwin Locomotive Wks.
General Electric Co.
McGuire-Cummings Mfg. Co
St. Louis Car Co.
Westinghouse E. & M. Co.

**Lubricating Engineers**
Galena Signal Oil Co.
Texas Company
Universal Lubricating Co.

**Lubricants, Oil and Grease**
Galena Signal Co
Texas Company
Universal Lubricating Co.

**Manganese Parts**
Bemis Car Truck Co

**Manganese Steel Castings**
Wm. Wharton Jr. & Co

**Manganese Steel Guards Rails**
Ramapo Ajax Corp.

**Manganese Steel, Special Track Work**
Bethlehem Steel Co.

**Manganese Steel Switches Frogs & Crossings**
Bethlehem Steel Co.
Ramapo Ajax Corp.

**Meters (See Instruments)**

**Molding, Metal**
Allis-Chalmers Mfg. Co.

**Motor Buses (See Buses, Motor)**

**Motors, Electric**
Allis-Chalmers Mfg. Co.
Westinghouse E. & M. Co.

**Motors and Generators, Sets**
Allis-Chalmers Mfg. Co.
General Electric Co.

**Motormen's Seats**
Brill Co., J. G.
Elec. Service Sup. Co.
Heywood-Wakefield Co.
St. Louis Car Co.
Wood Co., Chas. N.

**Nuts and Bolts**
Bemis Car Truck Co.
Bethlehem Steel Co.
Hubbard & Co.

**Oils (See Lubricants).**

**Oil Heaters**
Power Specialty Co.

**Omnibuses (See Buses, Motor)**

**Oxy-Acetylene (See Cutting Apparatus, Oxy-Acetylene)**

**Packing**
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

**Paints and Varnishes (Insulating)**
Irvington Varnish & Ins. Co.

**Paints and Varnishes for Woodwork**
National Ry. Appliance Co

**Pavement Breakers**
Ingersoll-Rand Co.

**Paving Material**
Amer. Br. Shoe & Fdy. Co.

**Pickup, Trolley Wire**
Elec. Service Supplies Co.
Ohio Brass Co.

**Pinion Pullers**
Elec. Service Supplies Co
General Electric Co.
Wood Co., Chas. N.

**Pinions (See Gears)**

**Pins, Case Hardened, Wood and Iron**
Bemis Car Truck Co.
Elec. Service Sup. Co.
Ohio Brass Co
Westinghouse Tr. Brake Co.

**Pipe Fittings**
Westinghouse Tr. Brake Co.

**Planers (See Machine Tools)**

**Plates for Tee Rail Switches**
Ramapo Ajax Corp.

**Pliers, Rubber Insulated**
Elec. Service Sup. Co.

**Pneumatic Tools**
Ingersoll-Rand Co. (A. S Cameron Steam Pump Works)

**Pole Line Hardware**
Bethlehem Steel Co.
Ohio Brass Co.

**Poles, Metal Street**
Elec. Ry. Equipment Co.
Hubbard & Co.

**Pole Reinforcing**
Hubbard & Co.

**Poles & Ties Treated**
Bell Lumber Co.
International Creosoting & Construction Co.
Weyerhaeuser Sales Co.

**Poles, Ties, Posts, Piling & Lumber**
Bell Lumber Co.
International Creosoting & Construction Co.
Weyerhaeuser Sales Co.

**Poles, Trolley**
Bell Lumber Co.
Elec. Service Supplies Co.
Nuttall Co., R. D.

**Poles, Tubular Steel**
Elec. Ry Equipment Co.
Elec. Service Sup. Co.

**Porcelain Special High Voltage**
Lapp Insulator Co., Inc.

**Potheads**
Okonite Co.

**Power Houses**
American Bridge Co.

**Power Saving Devices**
National Ry Appliance Co
Railway Improvement Co.

**Pressure Regulators**
General Electric Co.
Ohio Brass Co
Westinghouse E. & M. Co.

**Pumps**
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.

**Pumps, Vacuum**
Ingersoll-Rand Co.

**Punches, Ticket**
Bonney-Vehslage Tool Co
Intern'l Register Co., The
Wood Co., Chas N

**Rail Braces & Fastenings**
Ramapo Ajax Corp.

**Rail Filler**
Philip Carey Co.

**Rail Grinders (See Grinders)**

**Rail Joints**
Carnegie Steel Co.
Rail Joint Co.

**Rail Joints—Welded**
Lorain Steel Co.

**Rails, Relaying**
Foster Co., L. B.
Hyman-Michaels Co.

**Rails, Steel**
Bethlehem Steel Co.
Carnegie Steel Co.
Foster Co., L. B

**Railway Paving Guards, Steel**
Godwin Co., Inc., W. S.

**Railway Safety Switches**
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.

**Rail Welding**
Railway Track-work Co.

**Rattan**
Brill Co. The J. G.
Elec. Service Supplies Co.
Heywood-Wakefield Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

**Registers and Fittings**
Brill Co., The J. G.
Elec. Service Supplies Co.
Intern'l Register Co., The
Ohmer Fare Register Co.
Rouke Automatic Register Co.
St. Louis Car Co.

**Reinforcement, Concrete**
Amer Steel & Wire Co.

**Repair Shop Appliances (See also Coil Banding and Winding Machines)**
Elec. Service Supplies Co.

**Repair Work (See also Coils)**
General Electric Co.
Westinghouse E. & M. Co.

**Replacers, Car**
Elec. Service Sup. Co.

**Resistances**
Consolidated Car Heat. Co.

**Resistance, Wire and Tube**
General Electric Co
Westinghouse E. & M. Co.

**Retrievers, Trolley (See Catchers and Retrievers, Trolley)**

**Rheostats**
General Electric Co.
Westinghouse E. & M. Co.

**Roofing Car**
Pantasote Co., Inc.

**Roofs**
Haskelite Mfg. Co.

**Sanders, Track**
Brill Co., The J. G.
Elec. Service Sup. Co.
Nichols-Lintern Co.
Ohio Brass Co.
St. Louis Car Co.

**Sash Fixtures, Car**
Brill Co., The J. G.
St. Louis Car Co.

**Scrapers, Track (See Cleaners and Scrapers, Track)**

**Screw Drivers, Rubber Insulated**
Elec. Service Sup. Co.

**Seating Materials**
Pantasote Co.

**Seats, Bus**
Brill Co., J. G. The
Heywood-Wakefield Co.
St. Louis Car Co.

**Seats, Car (See also Rattan)**
Brill Co. The J. G.
Heywood-Wakefield Co.
St. Louis Car Co.

**Seating Materials**
Brill Co., J. G.
Heywood-Wakefield Co.
Pantasote Co., Inc.
St. Louis Car Co.

**Second Hand Equipment**
Electric Equipment Co.
Hyman-Michaels Co.
Transit Equipment Co.

**Shades, Vestibule**
Brill Co., The J. G.

**Shovels**
Brill Co., The J. G.
Hubbard & Co.

**Side Bearings (See Bearings, Center and Side)**

**Signals, Car Starting**
Consolidated Car Heat Co
Elec. Service Sup. Co.
Nat'l Pneumatic Co., Inc.

**Signals, Indicating**
Nichols-Lintern Co.
Oskel Equipment Co.

**Signal Systems, Highway Crossing**
Nachod Signal Co., Inc.
Wood Co., Chas N.

**Signal Systems, Block**
Elec. Service Sup. Co.
Nachod Signal Co., Inc.
Union Switch & Signal Co

**Slack Adjusters (See Brake Adjusters)**

**Sleet Wheels and Cutters**
Anderson Mfg. Co., A. & J. M
Elec. Ry Equipment Co.
Elec. Ry Improvement Co.
Elec. Service Supplies Co.

**More-Jones Brass & Metal Co.**
Nuttall Co., R. D.

**Smokestacks, Car**
Nichols-Lintern Co.

**Sockets & Receptacles**
National Metal Molding Co

**Snow Sweepers, Rattan**
Heywood-Wakefield Co

**Snow-Plows, Sweepers and Brooms**
Brill Co., The J. G
Consolidated Car Fender Co
McGuire-Cummings Mfg. Co.
St. Louis Car Co

**Soldering and Brazing Apparatus (See Welding Processes and Apparatus)**
Irvington Varnish & Ins Co.

**Solderless Connector**
Frankel Connector Co

**Special Adhesive Papers**
Irvington Varnish & Ins. Co

**Special Trackwork**
Bethlehem Steel Co.
Lorain Steel Co.

**Spikes**
Amer. Steel & Wire Co.

**Splicing Compounds**
Westinghouse E. & M. Co.

**Splicing Sleeves (See Clamps and Connectors)**

**Springs, Car and Truck**
Amer Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Fort Pitt Spring & Mfg Co.
St. Louis Car Co.

**Sprinklers, Track and Road**
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

**Steel and Steel Products**
Carnegie Steel Co.

**Steps, Car**
Brill Co., J. G., The
Morton Mfg. Co.

**Stokers, Mechanical**
Babcock & Wilcox Co.
Westinghouse E. & M. Co.

**Stop Signals**
Nichols-Lintern Co.
Oskel Equipment Co.

**Storage Batteries (See Batteries, Storage)**

**Strain, Insulators**
Anderson, A. & J. M. Mfg. Co.
Ohio Brass Co.

**Strand**
Roebling's Sons Co., J. A.

**Straps, Car, Sanitary**
Railway Improvement Co.

**Subway Boxes**
Johns-Pratt Co.

**Superheaters**
Babcock & Wilcox Co

**Sweepers, Snow (See Snow Plows, Sweepers and Brooms)**

**Switches, Safety**
Johns-Pratt Co

**Switches, Selector**
Nichols-Lintern Co.

**Switches, Tee Rail**
Ramapo Ajax Corp

**Switches, Track (See Track Special Work)**

**Switches and Switchboards**
Elec. Service Supplies Co.
General Electric Co
Westinghouse E. & M. Co.

**Tamper Tie**
Ingersoll-Rand Co.
Railway Track-work Co

**Tapes and Cloths (See Insulating Cloth, Paper and Tape)**

**Tee Rail Special Track Work**
Bethlehem Steel Co
Ramapo Ajax Corp

**Telephones and Parts**
Elec. Service Supplies Co.

**Terminals, Cable**
Std. Underground Cable Co

**Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)**

**Thermostats**
Consolidated Car Heat. Co.
Gold Car Heat. & Ltg. Co.
Railway Utility Co
Smith Heater Co., Peter

**Ticket Choppers & Destroyers**
Elec. Service Supplies Co

**Tickets & Transfers**
Globe Ticket Co.

**Ties, All-Metal**
Metal Safety R. R. Tie Co.

**Ties, Mechanical**
Dayton Mechanical Tie Co

**Ties and Tie Rods, Steel**
Carnegie Steel Co.
International Steel Tie Co.

**Ties, Wood (Cross (See Poles, Ties, Posts, etc.)**

**Tool Steel**
Bethlehem Steel Co.

**Tools, Track & Miscellaneous**
Amer. Steel & Wire Co.
Elec. Service Supplies Co
Hubbard & Co.
Railway Track-work Co.

**Torches, Acetylene (See Cutting Apparatus)**

**Towers and Transmission Structures**
Archbold-Brady Co.
Westinghouse E. & M. Co

**Track Grinders**
Railway Track-work Co

**Track, Special Work**
N. Y. Switch & Crossing Co.

**Trackless Trolley Cars**
Brill Co., J. G. The
St. Louis Car Co

**Track, Special Work**
Bethlehem Steel Co.
Buda Company
Columbia Machine Wks. & M. I. Co.
Ramapo Ajax Corp

**Transfer (See Tickets)**

**Transfer Issuing Machines**
Ohmer Fare Register Co

**Transfer Tables**
American Bridge Co.

**Transformers**
Allis-Chalmers Mfg. Co
General Electric Co.
Westinghouse E. & M. Co

**Treads, Safety, Stair, Car Step**
Morton Mfg. Co.

**Trolley Bases**
Elec. Service Supplies Co
General Electric Co.
More-Jones Brass & Meta Co.
Nuttall Co., R. D.
Ohio Brass Co.

**Trolley Bases, Retrieving**
Elec. Service Supplies Co.
Nuttall Co., R. D.
Ohio Brass Co.

**Trolley Buses**
Brill Co. The J. G.
General Electric Co.
Westinghouse E. & M. Co

**Trolley Material, Overhead**
Anderson, A. & J. M Mfg. Co
Elec. Service Supplies Co.
More-Jones Brass & Meta Co.
Ohio Brass Co.

**Trolley Wheel Bushings**
More-Jones Brass & Meta Co.

**Trolley Wheels & Harps**
More-Jones Brass & Meta Co.

**Trolley Wheels (See Wheels, Trolley)**

**Trolley Wire**
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co
Roebling's Sons Co., J. A

**Trucks, Car**
Baldwin Locomotive Wks
Bemis Car Truck Co.
Brill Co., The J. G.
McGuire-Cummings Mfg. Co
St. Louis Car Co.
Taylor Elec. Truck Co.

**Tubing, Yellow & Black Flexible Varnish**
Irvington Varnish & Ins Co.

**Turbines, Steam**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Turbines, Water**
Allis-Chalmers Mfg. Co.

**Turnstiles**
Elec. Service Supplies Co.
Perey Mfg. Co., Inc

**Turntables**
American Bridge Co.

**Valves**
Ohio Brass Co.
Westinghouse Tr. Br. Co.

**Varnished Papers & Silks**
Acme Wire Co.
Irvington Varnish & Ins. Co.

**Vestibules, Car**
Brill Co., The J. G.
Nat'l Ry. Appliance Co.
Nichols-Lintern Co.
Railway Utility Co.
St. Louis Car Co.

**Welded Rail Joints**
Alumino-Thermic Corp.
Elec. Ry Improvement Co.
Ohio Brass Co
Railway Track-work Co

**Welders, Portable Electric**
Elec. Ry. Improvement Co
Ohio Brass Co.
Railway Track-work Co.

**Welding Processes and Apparatus**
Alumino-Thermic Corp.
Elec. Ry Improvement Co.
General Electric Co.
International Oxygen Co
Ohio Brass Co.
Railway Track-work Co
Westinghouse E. & M. Co

**Welding Steel**
Elec. Ry Improvement Co
Railway Track-work Co.

**Wheel Guards (See Fenders and Wheel Guards)**

**Wheel Presses (See Machine Tools)**

**Wheels, Car, Cast Iron**
Bemis Car Truck Co
Carnegie Steel Co.

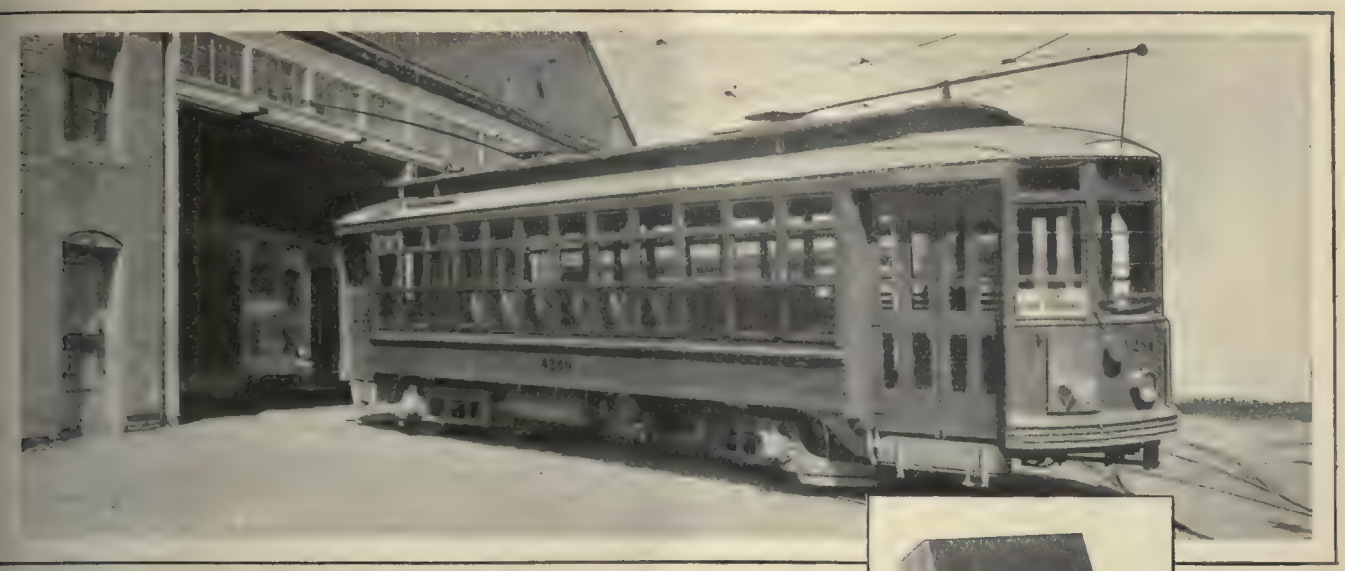
**Wheels, Wrought Steel**
Carnegie Steel Co

**Wheels, Trolley**
Elec. Ry Equipment Co.
Elec. Service Supplies Co
General Electric Co
More-Jones Brass & Metal Co.
Nuttall Co., R. D
Star Brass Works

**Whistles, Air**
General Electric Co
Ohio Brass Co.
Westinghouse E. & M. Co

**Wire Rope**
Roebling's Sons Co., J. A.

**Wires and Cables**
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co
General Electric Co.
Okonite Co.
Roebling's Sons Co., J. A.
Std. Underground Cable Co
Westinghouse E. & M. Co.





# Nationals win again!

AS FAR to the north of Boston as Haverhill, and as far to the south as Fall River, stretch the trolley lines of the Eastern Massachusetts Street Railway Company, serving a rich and busy territory centering on the Hub.

This company uses National Pyramid Brushes. These brushes were installed first on a test basis, in limited numbers. Our experience had indicated that they would solve the company's brush problems; the road was willing to put them to the trial.

To-day these brushes are being used on about 450 of these cars.

This is the way National Pyramid Brushes triumph—they prove their worth. The fact that they are in continual use by the largest urban and interurban lines and by central and substations, mills, mines and factories everywhere is proof of their ability to meet all conditions of use.

## National Pyramid Brushes

*Manufactured and guaranteed by*
NATIONAL CARBON CO., INC., Cleveland, Ohio—San Francisco, Cal.
Canadian National Carbon Co., Limited, Toronto, Ontario

*Emergency Service Plants*

CHICAGO, ILL.
551 West Monroe St.
*Phone:* STAte 6092

PITTSBURGH, PA.
7th Floor, Arrott Power Bldg. No. 3
Barker Place
*Phone:* SMIthfield 0740

NEW YORK, N. Y.
237 East 41st St.
*Phone:* VANderbilt 0425

# ALPHABETICAL INDEX TO ADVERTISEMENTS


Page

A

Ajax Metal Co ..... 42
Allis-Chalmers Mfg. Co..... 39
Allison Co., J. E. ..... 23
Alumino Thermic Corp. ..... 39
Amer. Brake Shoe & Fdy. Co.. 42
American Bridge Co..... 23
American Car Co ..... 51
American Electrical Works.... 37
American Steel & Wire Co.. 38
Anaconda Copper Mining Co... 37
Anderson Mfg. Co., A. & J. M.. 37
Archbold-Brady Co. ..... 23

B

Babcock & Wilcox Co ..... 39
Baldwin Locomotive Works .. 33
Becker, John A .. ..... 22
Bell Lumber Co ..... 50
Bemis Car Truck Co ..... 26
Bethlehem Steel Co ..... 38
Bibbins J. Rowland .. ..... 22
Bonney Vehicle Tool Co.. 40
Brill Co., J. G..... 51
Buchanan & Layng Corp .. 23
Bureau of Comm. Economies, Inc 23

C

Cameron Electrical Mfg. Co.... 39
Carnegie Steel Co..... 38
Chillingworth Mfg. Co..... 50
Cleveland Fare Box Co ..... 41
Collier, Inc., Barron G. Co.... 24
Consolidated Car Fender Co.... 41
Consolidated Car Heating Co... 31
Curtain Supply Co ..... 36

D

Day & Zimmerman Co., Inc. .. 22
Dayton Mechanical Tie Co.. 33
Differential Steel Car Co.....43

E

Electric Equipment Co.....44
Electric Railway Equipment Co 37
Electric Ry. Improvement Co 39
Electric Service Supplies Co... 11

Page

F

Ford, Bacon & Davis ..... 22
"For Sale" Ads ..... 44-45
Fort Pitt Spring & Mfg. Co.... 40
Foster Co., L. B..... 27

G

Galena-Signal Oil Co..... 19
General Electric Co..18, Back Cover
Gilbert & Sons Brass Foundry Co., A..... 43
Globe Ticket Co..... 35
Gold Car Heating & Ltg. Co... 41

H

Hale Kilburn Company ..... 34
Huskelite Mfg. Corp..... 40
"Help Wanted" Ads.....44-45
Hemphill & Wells ..... 22
Heywood Wakefield Co ..... 41
Holst, Englehard W. ..... 22
Hubbard & Co ..... 37
Hyman-Michaels Co. ..... 44

I

Ingersoll-Rand Co. ..... 47
International Creosoting & Construction Co ..... 12
International Motor Co ... 16-17
International Register Co., The. 41
International Steel Tie Co..... 9
Irvington Varnish & Insulator Co. ..... 39

J

Jackson, Walter ..... 22
Jeandron, W. J..... 42
Johnson & Co., J. R... 50
Johnson Fare Box Co. ..... 41
Johns-Pratt Co. .. ..... 37

K

Kelly Cooke & Co ..... 22
Kuhlman Car Co. ..... 51

Page

L

Laclede Steel Co..... 41
Lapp Insulator Co., Inc ..... 37
Le Carbone Co. .. ..... 42
Lorain Steel Co..... 38

M

McGraw-Hill Book Co..... 32
McGuire-Cummings Mfg. Co... 41
More-Jones Brass & Metal Co.. 43
Morton Mfg. Co..... 41

N

Nachod Signal Co., Inc ..... 37
National Brake Co., Inc ..... 21
National Carbon Co ..... 40
National Pneumatic Co., Inc 13
National Pole Co ..... 14
National Railway Appliance Co 39
New York Switch & Crossing Co 38
New York Transportation Co.. 15
Nichols, Lantern Co ..... 40
Nuttall Co., R. D ..... 32

O

Ohio Brass Co ..... 7
Ohmer Fare Register Co ..... 34
Okonite Co., The ..... 38
Ong, Joe R ..... 22
Osgel Equipment Co ..... 40

P

Pantasote Co., Inc ..... 30
Pantyte Co ..... 40
Perey Mfg. Co..... 40
Pierce-Arrow Motor Car Co.... 18
Positions Wanted and Vacant 44-45
Power Specialty Co ..... 39

R

Rail Joint Co..... 38
Railway Audit & Inspection Co., Inc. ..... 23
Railway Track-work Co.....
Railway Utility Co.....
Ramapo-Ajax Co.....
Richey, Albert S.....
Robinson Co., Dwight P. .....
Roebling's Sons Co., John A..
Rooke Automatic Register Co..

S

St. Louis Car Co.....
Samson Cordage Works.....
Sanderson & Porter.....
Searchlight Section ..... 44-
Shaw, Henry M.. .....
Silver Lake Co.....
Smith Heater Co., Peter, The..
Standard Underground Cable Co.
Star Brass Works .....
Stevens & Wood, Inc .....
Stone & Webster .....
Stucki & Co., A .....

T

Texas Co ..... 28-
Tool Steel Gear & Pinion Co ..
Transit Equipment Co .....

U

Union Switch & Signal Co....
U. S. Graphite Co .....
Universal Lubricating Co .....

W

"Want" Ads ..... 44-
Wason Mfg. Co.....
Westinghouse Elec. & Mfg. Co., 2,
Westinghouse Traction Brake Co.
Weyerhaeuser Sales Co.....
White Engineering Corp., The
J. G.....
Wish Service, The P. Edw ..
Wood Co., Chas. N.....



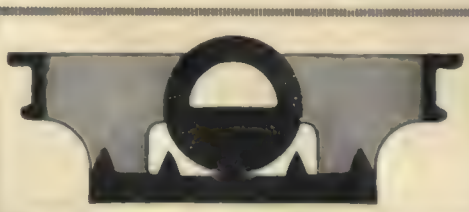
**Northern CEDAR POLES Western**

We guarantee
all grades of poles; also any butt-treating specifications

**BELL LUMBER COMPANY**
Minneapolis, Minn.

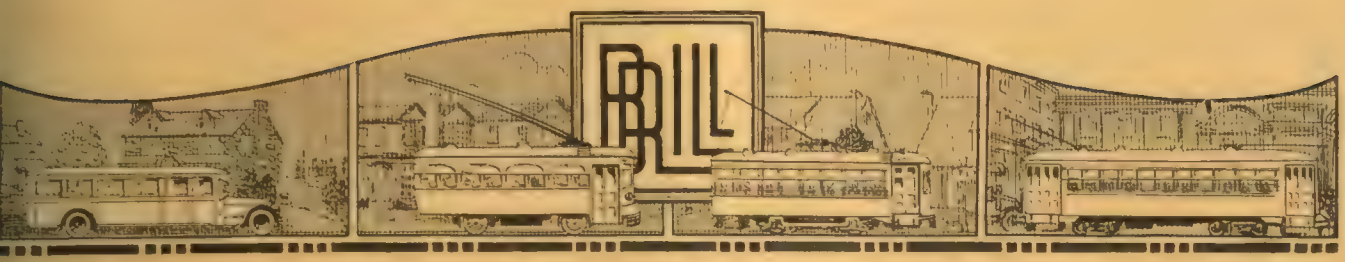


**CHILLINGWORTH**
One-Piece Gear Cases
Seamless—Rivetless—Light Weight
Best for Service—Durability and Economy. *Write Us.*
**Chillingworth Mfg. Co.**
Jersey City, N. J.



**STUCKI SIDE BEARINGS**
A. STUCKI CO.
Oliver Bldg.
Pittsburgh, Pa.

"Axle Specialists Since 1866"
Address all Mail to Post Office Box 515, Richmond, Va.
**CAR AXLES**
**J. R. JOHNSON AND CO., INC.**
FORGED STEEL AXLES
For Locomotives, Passenger, Freight and Electric Cars
Smooth Forged or Rough Turned—Carbon or Alloy Steel—Plain or Heat Treated, Forged and Turned Piston Rods, Crank Pins, Large Shafts, Round Bars, etc.






# 50 Cars for Pacific Electric

## All Steel

Included among recent shipments of cars from our Philadelphia Plant was a lot of fifty center-entrance front-exit type for the Pacific Electric Railway, Los Angeles.

These cars are of all-steel construction according to the railway's standard design and measure 52 ft. 2 in. over bumpers, 8 ft. 10 in. wide over posts and accommodate 65 seated passengers.

This type car weighs less than 23 tons complete, ready for operation which is comparatively light for this class of high-speed service.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.
AMERICAN CAR CO. ST LOUIS MO. — G.C. KUHLMAN CAR CO. CLEVELAND, OHIO. — WASON MANF'G CO. SPRINGFIELD, MASS.




KEEPING your equipment physically fit—*maintenance*—means keeping it most fit for profits.

You should *maintain* your equipment with duplicate parts—built by the equipment manufacturer—and thereby insure against the high cost of repeated pull-ins.

You should *modernize* existing equipment by installing wherever possible new devices that are designed to give better service at a lower maintenance cost.

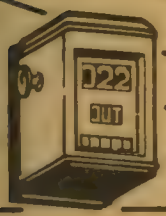
GENERAL ELECTRIC

Schenectady, N. Y.

MAINTENANCE ISSUE

McGraw-Hill Company, Inc. November 15, 1924 Twenty Cents Per Copy

ELECTRIC RAILWAY JOURNAL




# $50,000,000

has been added to the operating revenue of the transportation industry during the past decade by the use of

## JOHNSON DEVICES

This amount represents an annual return of more than 100% on the investment cost.

We appreciate the splendid co-operation given us by the transportation companies. This co-operation has kept us progressing with the advancement in the art. As a result of this co-ordination we are confident today that the use of our improved instantaneous devices will effect an even greater saving for transportation companies in the next ten years.

*"Modernize" your fare collection*




JOHNSON FARE BOX CO.

*General Offices*
4619 Ravenswood Ave.
Chicago, Ill.

*New York Offices*
366 Madison Ave.
New York, N. Y.

# Correct Size
# Correct Fit



## Longer life in Service



**Westinghouse Armature Coils are made better–**

therefore last longer.

Correct insulation, together with the proper dipping and baking, reduce coil breakdowns. Reinforced at all points of strain and at the leads is but one of the many outstanding features of Westinghouse coils.

An easy way to eliminate your rewinding troubles is to always use Westinghouse renewal coils with Westinghouse equipment.

Renewal coils are made on the original moulds and fixtures—they are correct size and correct fit for your Westinghouse motors.

Place your order for stock shipment from your nearest Westinghouse district office.

Westinghouse Electric & Manufacturing Company
Homewood Works Homewood, Penna.
Sales Offices in all Principal Cities of the United States and Foreign Countries.

# Westinghouse

*Vol. 64, No. 20* New York, November 15, 1924 *Pages 829-868*

# ELECTRIC RAILWAY JOURNAL

MORRIS BUCK
Associate Editor
C. W. SQUIER
Associate Editor
JOHN A. MILLER, Jr.
Assistant Editor
C. J. MacMURRAY
News Editor

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

CHARLES GORDON
Western Editor
Old Colony Bldg., Chicago
MERRILL B. KNOX
Editorial Assistant
Old Colony Bldg., Chicago
CARL W. STOCKS
Associate Editor

## CONTENTS

**Editorials** ..... 829

**Rapid Track Reconstruction with Butt-Welded Joints** ... 831
Third Avenue Railway tries new butt-weld method of making joints on large replacement job on upper Broadway. Designed by manufacturer to facilitate the work. This and organization make speedy progress possible. Easily moved cross-overs aided in avoiding interruption to service.

**Paving Guards Used in Halifax** ..... 833

**Special Tools Facilitate Machining of Bearings** ..... 834
By the development and employment of many special tools the Twin City Rapid Transit Company has applied production methods to the various operations of finishing bearing shells.

**New Chicago Multiple-Unit Cars Have Automatic Exit Doors** ..... 837
These new type cars of the Chicago Surface Lines are designed to give maximum flexibility either as single units or in two-car trains. They are arranged for double-end operation and are equipped with two 65-hp. motors per car mounted on maximum traction trucks.

**Thermit Process Gives Good Results in Youngstown** .... 841
By D. J. GRAHAM.
This method is used in the installation and repair of crossings, switches and mates, compromise joints and other special work. It has been the standard of the company since 1916.

**Chicago Surface Lines Reroutes 1,600 Cars** ..... 843

**The Readers' Forum** ..... 844

**Equipment Maintenance Notes** ..... 846

**Association News and Discussions** ..... 852

**Regulators Must Avoid Competition** ..... 852
By J. N. SHANNAHAN.
Essential railways must be protected from inroads of a competitor not capable of replacing them by regulation that will develop the bus along sound lines to its own best interest and to the public's.

**Self-Ventilated Motors in Central Europe** ..... 854
By E. NIE.

**Track Standards in Central Europe** ..... 854
By PAUL GOETZ.

**European Progress with Magnetic Brakes** ..... 855
By JÖRGEN F. S. BARTH.

**Correction of the Headway Inequalities** ..... 856
By ALEXANDER PATZ.

**News of the Industry** ..... 857

**McGraw-Hill Company, Inc., Tenth Ave. at 36th St., New York**

JAMES H. McGRAW, President
ARTHUR J. BALDWIN, Vice-President
MALCOLM MUIR, Vice-President
E. J. MEHREN, Vice-President
MASON BRITTON, Vice-President
JAMES H. McGRAW, JR., Vice-Pres. and Treas.
C. H. THOMPSON, Secretary

WASHINGTON:
Colorado Building
CHICAGO:
Old Colony Building
PHILADELPHIA:
Real Estate Trust Building
CLEVELAND:
Leader-News Building
ST. LOUIS:
Star Building
SAN FRANCISCO:
883 Mission Street
LONDON
6 Bouverie Street, London, E. C. 4

1924

Cable Address: "Machinist, N. Y."
Publishers of
*Engineering News-Record*
*American Machinist*
*Power*
*Chemical and Metallurgical Engineering*
*Coal Age*
*Engineering and Mining Journal-Press*
*Ingeniería Internacional*
*Bus Transportation*
*Electric Railway Journal*
*Electrical World*
*Electrical Merchandising*
*Journal of Electricity*
*(Published in San Francisco)*
*Industrial Engineer*
*(Published in Chicago)*
*Electrical Retailing*
*(Published in Chicago)*
*American Machinist—European Edition*
*(Published in London)*

Member Associated Business Papers, Inc.
Member Audit Bureau of Circulations

The annual subscription rate is $4 in the United States, Canada, Mexico, Alaska, Hawaii, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, Colombia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brazil, Spain, Uruguay, Costa Rica, Ecuador, Guatemala and Paraguay. Extra foreign postage to other countries $3 (total $7 or 29 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid to any part of the world, 20 cents.
Change of Address—When change of address is ordered the new and the old address must be given, notice to be received at least ten days before the change takes place.
Copyright, 1924, by McGraw-Hill Company, Inc.
Published weekly. Entered as second-class matter, June 23, 1908, at the Post Office, at New York, under the Act of March 3, 1879. Printed in U.S.A.

## *The Ads Are Full of Information, Too*

NORTHERN TEXAS TRACTION COMPANY
Ft. Worth, Texas

October 25, 1924.

ELECTRIC RAILWAY JOURNAL,
10th Avenue and 36th St.,
New York, N. Y.

GENTLEMEN:

I have your letter of the 20th. It is a pleasure to give you, enclosed herewith, such information as we have and I hope you will not hesitate to write if you feel there is anything further we can do for you.

From the pages of your journal we have received considerable information and on our property you will find that practically all the materials we have adopted as standard are advertised in your paper. In fact, through your advertising pages we have found information on most of the things we purchase, and in many cases our original information that led to adoption came through your columns.

Yours very truly,
V. W. BERRY,
General Superintendent.

**THIS is a testimonial of the valuable information and data that are to be found in the advertising pages of a high-grade business publication, as well as in the text pages. The latter, of course, are not available to tell about the products of individual manufacturers, except to describe a new device or material when it is first put on the market. It is then a matter of news, and the industry looks to the JOURNAL text pages for all the news.**

**But after the one news handling, the reader must look to the advertising pages to get his information about equipment and supplies. It is there that the story of a device can be told over and over, adding new data, describing new applications, showing new cost data, picturing it in new installations, explaining why it is a desirable addition to the railway's equipment. The live manufacturer uses his advertising space this way and the reader profits accordingly, as noted in the letter above.**

# "Outstanding Success in gaining public goodwill"

This is one of the two leading factors in awarding the annual Coffin Prize. "Gaining goodwill" depends on giving good service. All authorities agree that good service boils down to safety, speed and comfort. That combination is achieved only by keeping track in first class condition. Track welding and grinding by means of the modern equipment here shown keep track maintenance expense down and insure safe, speedy, silent, comfortable track,—gain public goodwill.

*Look at the equipment*
*Write for a quotation*

**Railway Track-work Co.**

3132-48 East Thompson Street, Philadelphia

AGENTS:
Chester F. Gailor, 30 Church St., New York
Chas. N. Wood Co., Boston
Electrical Engineering & Mfg. Co., Pittsburgh
Atlas Railway Supply Co., Chicago
Equipment & Engineering Co., London

(330)



"Reciprocating" Track Grinder



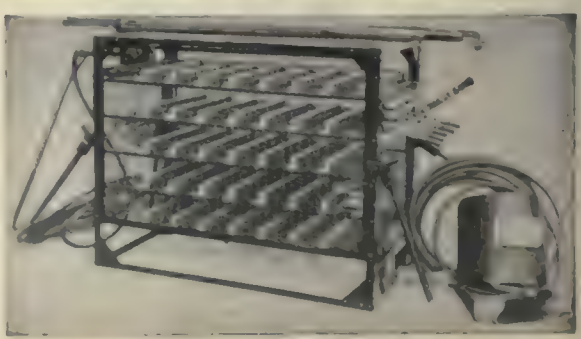
"Universal" Rotary Track Grinder



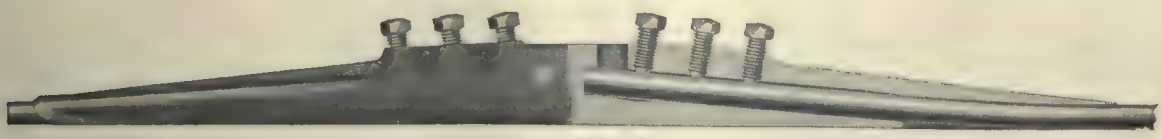
"Atlas" Rail Grinder



"Hercules" Swing Frame Rail Grinder



"Ajax" Electric Arc Welder



Type C



Cleveland



Type CM (short type C)

# SPLICERS

Now is the time to fix up the weak spots in the trolley—to prepare for cold weather breaks. Here is variety to suit your needs. Get your stock bins ready now.



Improved Clark



KI Type



Type D

**The Ohio Brass Co.**
Mansfield, Ohio, U.S.A.
TROLLEY MATERIAL — ELECTRIC RAILWAY CAR EQUIPMENT — RAIL BONDS — HIGH TENSION PORCELAIN INSULATORS — THIRD RAIL INSULATORS
NEW YORK — PHILADELPHIA — PITTSBURGH
CHICAGO — CHARLESTON, W. VA.
LOS ANGELES — SAN FRANCISCO — PARIS, FRANCE
Dominion Insulator & Mfg. Co., Limited Niagara Falls, Ontario, Canada

# CYCLONE

"Galv-After" Chain Link

## FENCE FABRIC

## Points of Superiority

HEAVILY ZINC-COATED (OR HOT-GALVANIZED) BY HOT-DIPPING PROCESS AFTER WEAVING. NO ANNUAL PAINTING.

ZINC COATING IS APPROXIMATELY 5 TIMES AS HEAVY AS THAT APPLIED TO CHAIN LINK FABRIC MADE FROM COMMERCIAL WIRE GALVANIZED BEFORE WEAVING.

ZINC COATING IS UNIFORM. ALL POINTS PROTECTED. NO LUMPS, NO FROZEN OR SOLDERED INTERSECTIONS.

Cyclone "Galv-After" Chain Link Fence Fabric effectively resists corrosion. Gives maximum property protection with minimum upkeep expense. "Galv-After" Fence is also built in removable panels for transformer station enclosures. Facilitates handling of equipment.

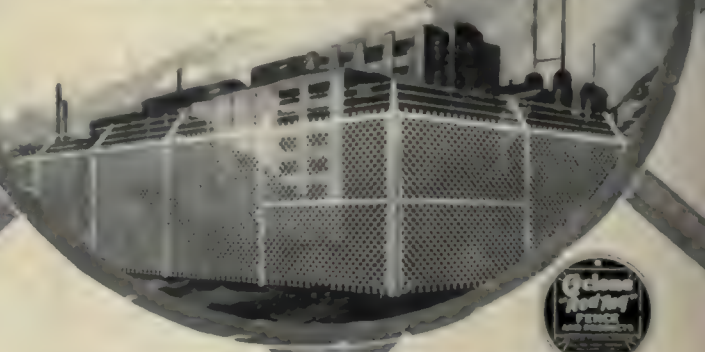
We also build Iron Fence suited to any purposes.

*Write nearest offices, Dept. 38*

CYCLONE FENCE COMPANY

*Factories and Offices:*

Waukegan, Ill. Cleveland, Ohio
Newark, N. J. Fort Worth, Tex.
Oakland, Calif., (Standard Fence Co.)
Portland, Ore., (Northwest Fence and Wire Works)



*The Mark of Quality Fence and Service*

PROPERTY·PROTECTION·PAYS



# All Permanent Materials Make Paved Track Renewable

The combination of the simple and permanent materials, *steel and concrete* with the ordinary methods of track and paving construction developed by fifteen years' experience of our users make Twin Tie Track renewable.

In its essentials the renewal feature of Steel Twin Tie Construction depends on the fact that there is nothing in such construction to absorb water to start cracks nor to rot and undermine rail and joints.

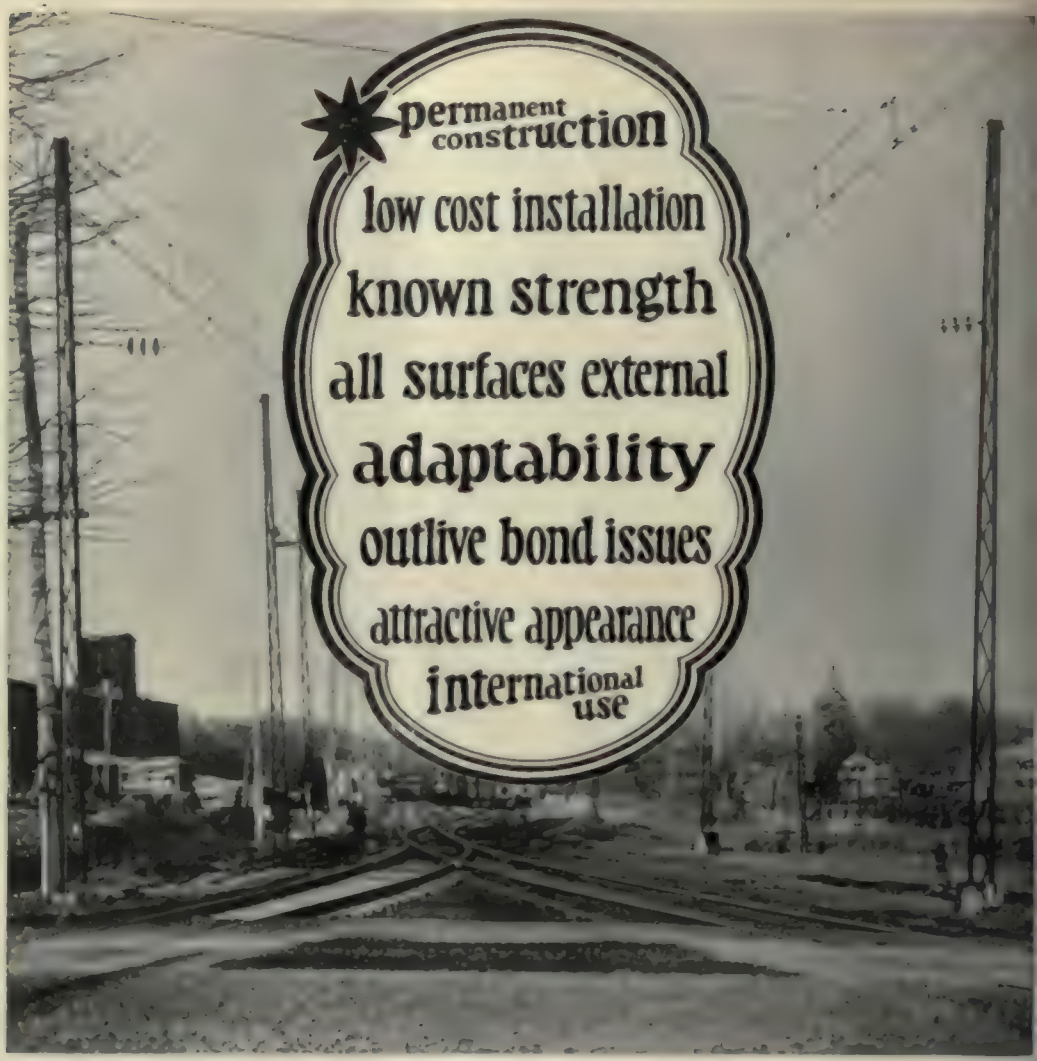
When you hear that such construction is lower in first cost than wood tie construction the rumor deserves intensive investigation.

**Write for all the data when you are ready to plan your 1925 Paved Work.**

**THE INTERNATIONAL STEEL TIE CO., Cleveland, Ohio**

# Steel Twin Tie Track

## Economical — Permanent — Renewable




★ Hundreds of thousands of Bates steel poles have been erected throughout this country, Europe and Asia. It is significant that they are today giving sturdy service under the stress of unusual loads, and the trying conditions of many climates.

The rigorous storms of 1921 in this country, the stress of the sleet and ice loads of the winter of 1923, passed—without a single report being made about Bates poles having failed to stand! The permanency of Bates poles, the fundamental strength of the Bates section, has long been proved.

For permanent construction use Bates steel poles!

Bates Expanded Steel Truss Co.
Illinois Merchants Bank Bldg.
Chicago, Ill., U. S. A.

BATES ONE PIECE EXPANDED STEEL POLES

# KEYSTONE EQUIPMENT

## *in the electric railway field!*



**FARADAY**
**Car Signal Systems**



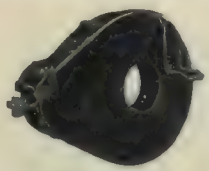
**GOLDEN GLOW**
**Headlights**



**KEYSTONE**
**Compensating Lighting Fixtures**



**KEYSTONE**
**Trolley Catchers**



**KEYSTONE**
**Steel Gear Cases**

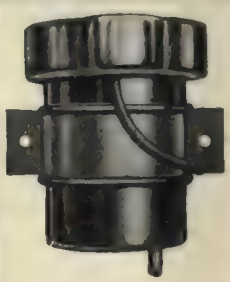



**KEYSTONE-HUNTER**
**Route and Destination Signs**

*The durability, satisfactory service and the great adaptability of Keystone Devices leads to their use by the majority of electric railway companies in the Country—*



**KEYSTONE**
**Rotary Gongs**



**KEYSTONE**
**Lightning Arresters**

## The Keystone Line Includes:

### Keystone Car Equipment

Illuminated Destination Signs
Steel Gear Cases
Motormen's Seats
Faraday Car Signals
Lighting Fixtures
Golden Glow Headlights
Headlight Resistances

Air Sanders
Trolley Catchers
Shelby Trolley Poles
Lightning Arresters
Rotary Gongs
International Fare Registers
Fare Register Fittings

Samson Cordage
Air Valves
Cord Connectors
Trailer Connectors
Automatic Door Signals
Standard Trolley Harps
Standard Trolley Wheels

### Keystone Line and Track Equipment

Rail Bonds
Rail Bond Testers
Electric Drills

Section Switches
Section Insulators
Trolley Hangers
Lightning Arresters

Trolley Ears
Trolley Frogs
Splicing Sleeves




***Consult Catalog No. 7***
**for full list and detailed data**

# ELECTRIC SERVICE SUPPLIES CO.

PHILADELPHIA
17th and Cambria Sts.

PITTSBURGH
629 Oliver Building

NEW YORK
50 Church St.

SCRANTON
316 N. Washington Ave.

CHICAGO
Monadnock Bldg.

BOSTON
88 Broad St.

Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver

# Miami

## The Magic City Adopts ELRECO POLES








In adopting ELRECO Combination Railway and Lighting Poles beautiful Miami, Fla., has accomplished three things: (1) Improved the appearance of the streets, (2) obtained an ornamental lighting system, and (3) provided the most economical and satisfactory means of supporting trolley wires. No other type of pole is so well adapted to joint traction and lighting service. None is so truly economical.

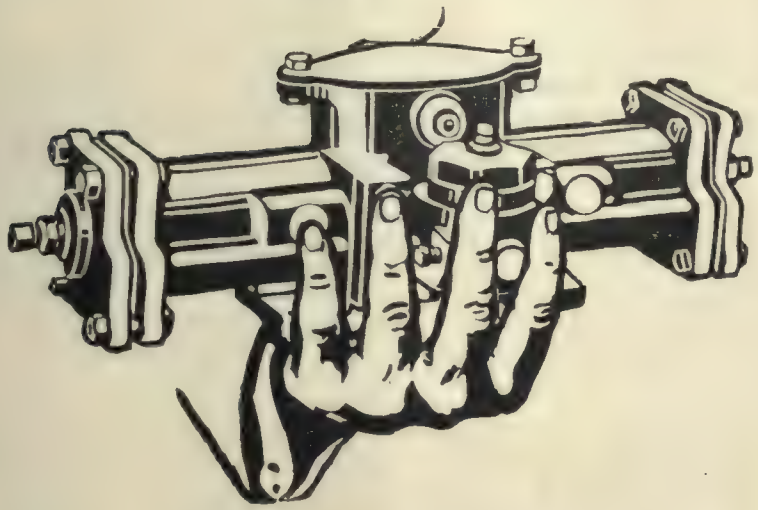
Hundreds of other cities have done the same thing. The street railways and lighting companies in these cities have made substantial savings by using the same set of poles for trolley span-wires and lighting circuits. ELRECO Poles are preferred because they combine lowest cost, lowest maintenance, least weight, greatest strength and adaptability.

Street railway executives, get the facts about these poles.



**The Electric Railway Equipment Co.**
**Cincinnati, Ohio**
**New York Office: 30 Church Street**

# *Here's a proved device*



When you consider that over 80 per cent of all the electric railways in the country are partially or wholly equipped with N-P Door Engines you know that they must have merit.

## *Our Service is proved too*

National Pneumatic Service is a conspicuous feature of every door engine, every connecting rod and every bolt you order from us.

Our service consists not alone in furnishing a perfectly-balanced operating unit, but also in the fact that our experts are at your disposal for service from the conception of the installation until it is operating satisfactorily on the road.

## National Pneumatic Company, Inc.

*Originators and Manufacturers*

EXECUTIVE OFFICE: 50 Church Street, NEW YORK

Philadelphia, 1010 Colonial Trust Building Chicago, 940 McCormick Building

*General Works*—Rahway, New Jersey

***Manufactured in Canada by***

**Dominion Wheel & Foundries, Ltd., Toronto, Ont.**

# CENTRALIZED RESPONSIBILITY

## Reduces Accident Hazard



## SAFETY CARS

Experience shows that fewer accidents result when operating responsibility is centralized in one man and NOT DIVIDED between two.

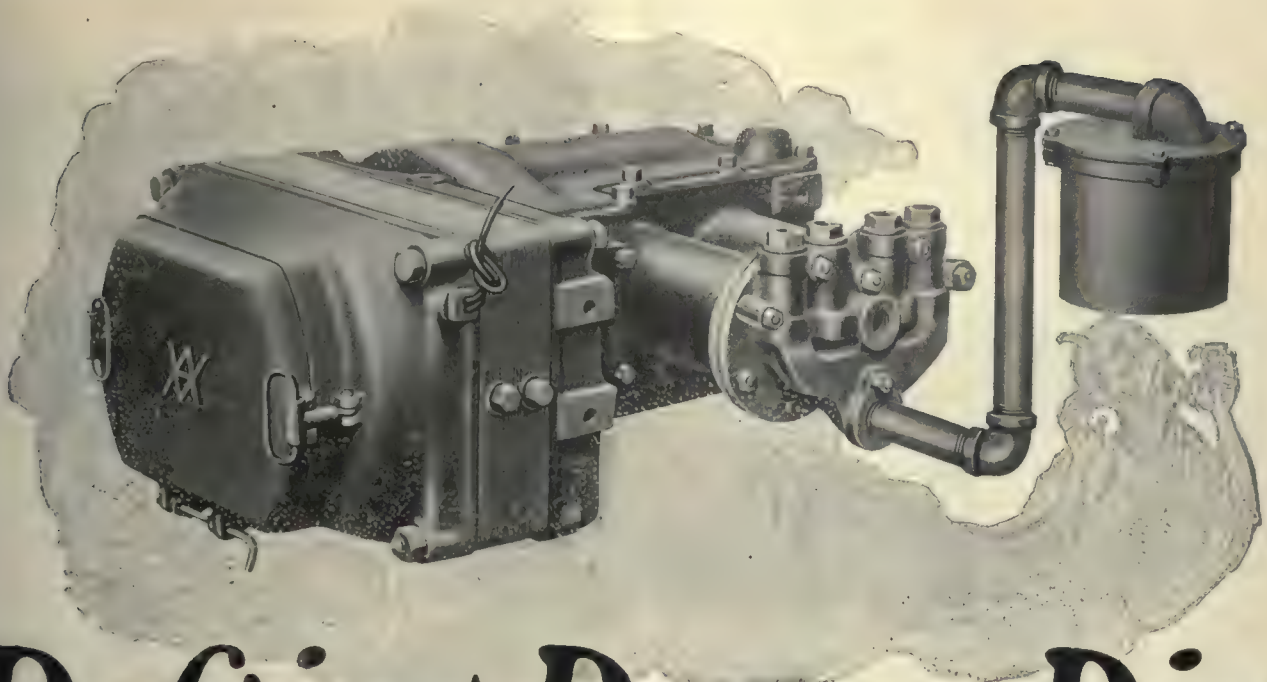
Every accident is an expense. Fewer accidents mean less expense, GREATER PROFITS.



**SAFETY CAR DEVICES CO.**
OF ST. LOUIS, MO.

*Postal and Telegraphic Address:*
**WILMERDING, PA.**

CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH



# Defying Demon Dirt

Around every compressor there is a demon lurking in the air —DIRT. It will stealthily, though surely, work havoc if permitted to gnaw at the vitals of the compressor.

Air must, of course, be drawn in from the atmosphere to be compressed, but dirt will also rush in unless an effective barrier is set up against this pernicious enemy of good compressor performance.

If dirt does enter with the intake air, two things are sure to happen. First, proper lubrication will be destroyed, because the dirt, mixing with the oil, forms an abrasive which causes excessive wear on cylinders, pistons, packing rings and valves. Second, the mixture of oil, dirt and ground iron will deposit in passages and on valves, resulting in lower efficiency of the compressor.

You can repulse the attack of this demon of dirt with the 8-*in. Suction Strainer*. It effectually filters out the grit and dust, permitting clean air to pass on into the compressor. Result—better performance, lower maintenance expense and longer life.

Is *your* compressor thus properly safeguarded against the insidious enemy—DIRT?



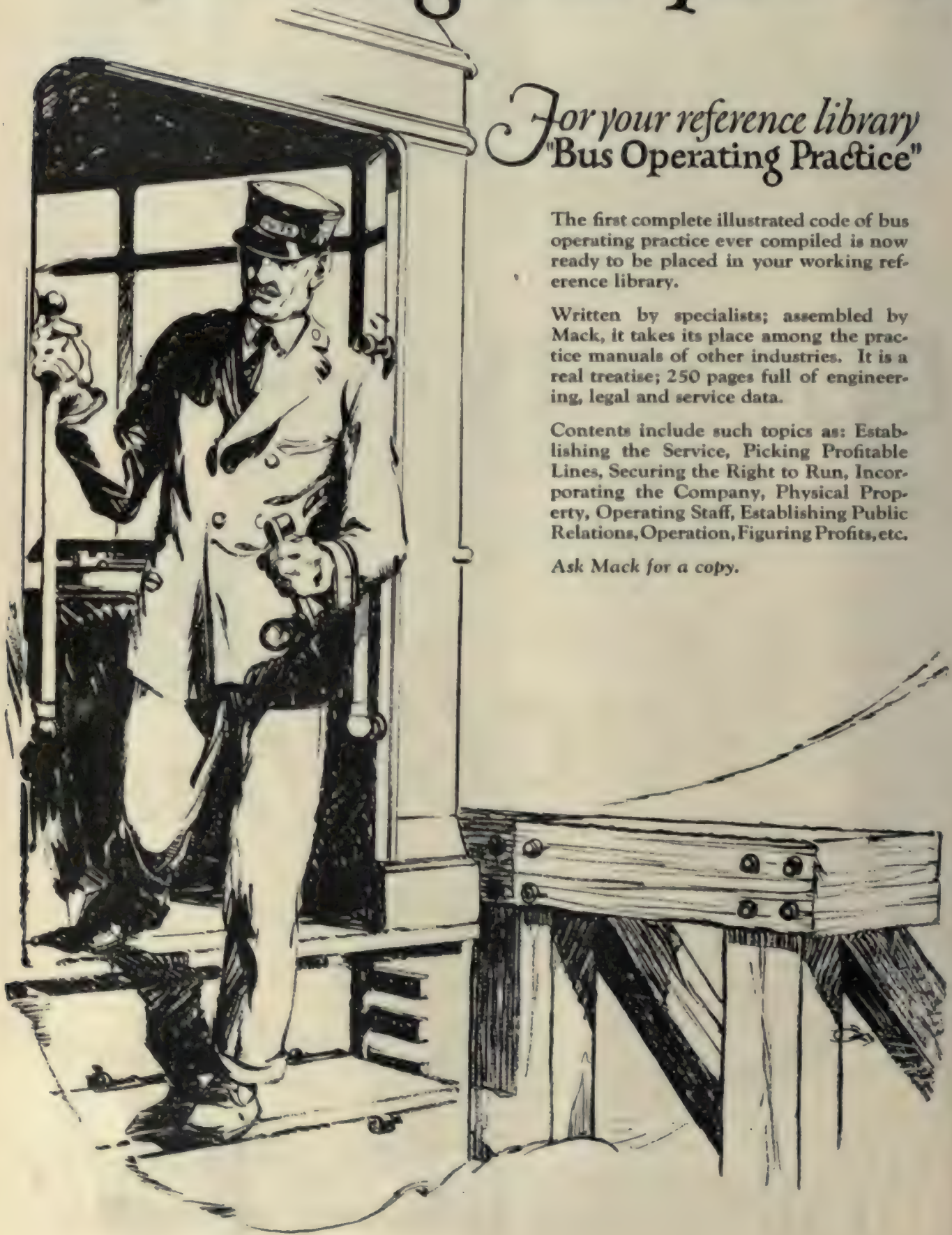
**The 8-in. Suction Strainer consists of a cylindrical body with a compact layer of pulled, curled hair between two perforated plates, and is so constructed as to be readily taken apart for cleaning at stated periods.**

**WESTINGHOUSE TRACTION BRAKE CO.**

**General Office and Works: WILMERDING, PA.**

# WESTINGHOUSE TRACTION BRAKES

# The Bridge that spans the



## For your reference library "Bus Operating Practice"

The first complete illustrated code of bus operating practice ever compiled is now ready to be placed in your working reference library.

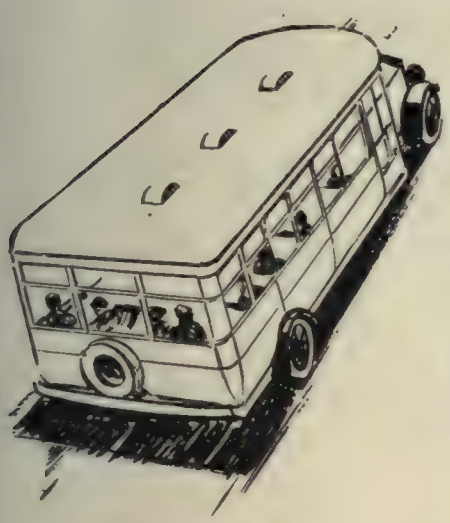
Written by specialists; assembled by Mack, it takes its place among the practice manuals of other industries. It is a real treatise; 250 pages full of engineering, legal and service data.

Contents include such topics as: Establishing the Service, Picking Profitable Lines, Securing the Right to Run, Incorporating the Company, Physical Property, Operating Staff, Establishing Public Relations, Operation, Figuring Profits, etc.

*Ask Mack for a copy.*

# gap—





That gap that lies between the end of the trolley line and the fast growing outlying section!

Bridge it with buses. Bring those many fares to the cars with a type of service that invites passengers and which is economical from an operating standpoint. Span the gap, as many leading railways are doing, with extension service handled by buses.

But recognize this fact.

The riding public today is as particular about bus comfort and adherence to schedule as you are about economies in daily operation and maintenance costs.

In the Mack bus these requirements have been welded.

From the passenger standpoint, the appearance of a Mack bus is an invitation to ride—and each ride invites another, so easily do Mack buses float over the road and so luxurious are their many appointments.

The many engineering features, all planned and built by Mack, contribute to the desired efficiency and economy of bus operation. A few of these features are—

The sturdy long-life Mack engine.

The wide front axle, assuring safety and permitting a short turning radius.

The Mack dual reduction drive axle especially designed to give maximum road and under-body clearance.

The exclusive Mack Shock Insulator. (All spring ends are embedded in rubber shock insulator cushions, eliminating metallic contact between springs and frame, absorbing vibrations, affording yielding support to springs and banishing shackle wear and lubrication.)

The Mack transmission with ground gears.

Dual system of brakes on wheels and drive shafts.

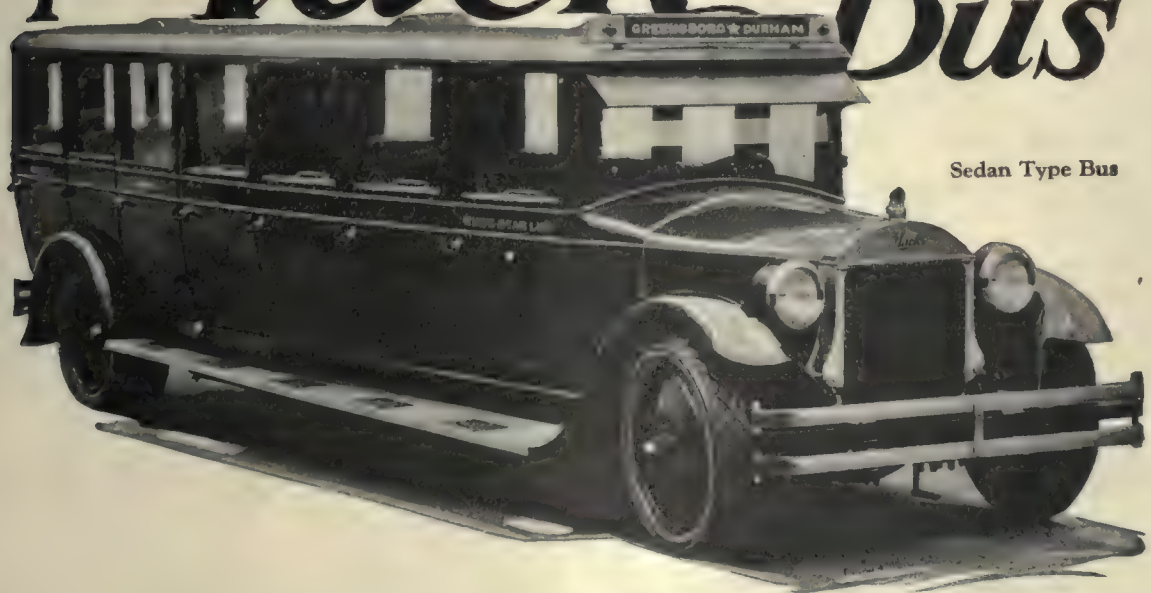
The Mack Street Car Body.

From bumper to tail-light the Mack is all bus—planned and built by Mack to Mack standards.

MACK TRUCKS, INC.
INTERNATIONAL MOTOR COMPANY
25 BROADWAY NEW YORK CITY

Eighty-three direct MACK factory branches operate under the titles of: "MACK MOTOR TRUCK COMPANY" and "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION."

# The Mack Bus




Sedan Type Bus

*Performance counts!*




# *For Building up Cupped Rail and Hard Wearing Surfaces*

**A Welding Rod that deposits clean, homogeneous rail-hard steel and welds as easily and freely as a low carbon Rod.**

## UNA Rod 300—A Coated Rod

The coating of UNA Rod 300 serves essentially two purposes:

First: It stabilizes the arc.

Second: It contains powerful deoxidizers, which

(a) prevent sputtering and the formation of blow-holes.

(b) deoxidize the surface of the base metal, allowing the deposited metal to unite with clean base metal to form a thorough homogeneous weld.

(c) scavenges the deposited metal, leaving a clean steel of high quality.

## Welding Properties

UNA Rod 300 flows as easily and freely as a low carbon rod. Layers of metal of any desired thickness can be deposited without continuous retracing to eliminate blow-holes.

## The Weld Metal

The weld metal deposited by UNA Rod 300 is solid and practically free from porosity and blow-holes. Its hardness, as measured by scleroscope tests is about that of rail-steel. Its carbon content varies between 0.50 and 0.60%.

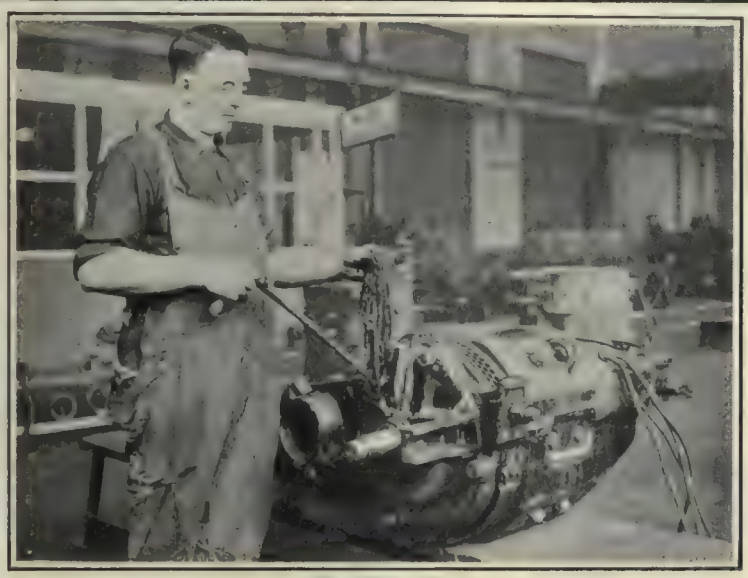
***UNA Rod 300 is recommended especially for the building up of cupped rail and for all surface welding where a hard, relatively high carbon metal is desired.***

***Let your welder try a sample package at our expense.***

## RAIL WELDING AND BONDING COMPANY
### Cleveland, Ohio

**Agents in England: Scholey Construction Co., Limited, 137 Victoria Street, Westminster, London**

# Galena Oils and Service



## Doing it right!

### How?—When?—Where?—and What?

Four fundamental questions in electric railway lubrication problems!

On the correct answers to these questions and the efficient execution of the policies laid out, depends nearly the whole structure of truck and motor bearing maintenance costs.

Galena Lubrication is more than oil alone. It is oil plus experience plus service. Each of these factors is essential to good results. With the best of oils as a base, Galena applies a lifetime of experience to produce the right lubricant to fit each condition and then through Galena Service insures its proper employment.

Galena Lubrication always results in increased availability of equipment, fewer delays and lowered maintenance cost.

## Galena-Signal Oil Company

New York - Franklin, Pa. - Chicago

and offices in principal cities









*Don't purchase supplies at random. Use your G-E Catalog*

# Why Continue
## to scrap the whole brush-holder?

That's a fair question. When only the carbon-way is worn, why put on a complete new brush-holder, now that you can replace the worn part for about one-fifth the cost?

Use G-E Renewable Carbon-Way Brush-holders and reduce this item of maintenance.

New G-E Motors are furnished, of course, with these improved holders. But many companies have equipped their old motors likewise, because they want fewer motor failures, lower maintenance, and better service.

**General Electric Company**
**Schenectady, N. Y.**
**Sales Offices in all Large Cities**

40-225

# GENERAL ELECTRIC

New York, Saturday, November 15, 1924

# Electric Railway Journal

*Consolidation of Street Railway Journal and Electric Railway Review*

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

*Volume 64*
*Number 20*

## Machine Tools Will Be Developed Only if Electric Railways Buy

ONE of the most common deficiencies of electric railways is the glaring inadequacy of their shop equipment. Some 40 per cent of their machine tools are more than 20 years old. Many improvements in machine tools have been made, the benefits of which are not being shared to any extent in our field. These improvements should be given careful consideration as a part of their modernization program.

Some of the machines of late design which are particularly suitable for electric railway shop conditions include lathes, drill presses and planers, with provision for increased speed and capacity of the drive and feed mechanism to give greater production. Another marked improvement in machine tool equipment is in the new methods used for lubricating bearing parts. Many recent machines have forced-feed lubrication of all bearings and an oil bath for gearing. Rapid developments have been made in grinding machines, and many electric railways are obtaining definite economies from substitution of grinding operations for the machining methods previously used.

There has also been considerable activity in the design of smaller tools and general utility machines. These are very useful for small electric railway properties where the amount of work of one particular class is insufficient to warrant the investment in a special machine for a particular type of work.

Machine tool manufacturers have developed a number of new designs of machine tools particularly adapted to electric railway work. But these tools have not actually been constructed pending the receipt of orders. The manufacture and future development of machines especially designed for the electric railway thus depends to a large extent on whether electric railway men show signs of desiring such improvement by actual purchases.

## An Amateur Watch Repairer Is a Poor Man to Imitate

THE story of the amateur watch repairer who after taking a clock apart and tinkering with it put it together again and had a number of wheels left over is familiar to all of us. It is a classic example of what happens when an unskilled workman undertakes a difficult job.

But what of the railway trackman who tears up the pavement to repair a joint and has a quantity of paving material left over after he has completed the work? Such things occur with greater frequency, perhaps, than some managements realize. The reason that there is a surplus of paving material, of course, is that the pavement has not been put back properly. It is a great deal more difficult to restore the surface as it should be than simply to fill up the hole with dirt and stones and to dispose of the excess material. Slipshod track maintenance methods of this kind, however, are as great a reproach to the railway which permits them as are the tinkering methods of the watchmaker who has extra parts left over.

Since the automobile has come into as widespread use as it has at the present time, the quality of the street paving is a matter of interest to a far larger number of people than it used to be. Coincident with this the electric railways have undertaken on a large scale to cultivate public good will in the communities they serve. But it is of little avail to talk of "friendlyizing" the public while continuing to do things that are a source of irritation to large numbers of people. It is certainly a mistake to economize on track maintenance to the extent that the pavement in the railway area contrasts unfavorably with the pavement elsewhere in the street. The money saved in making cheap pavement repairs is a poor economy if the finished surface is rough and unsightly, and a source of annoyance to the general public.

## Using Railway Labor More Efficiently

THE problem of stabilizing the work done by the maintenance forces of an electric railway is rendered more important now that higher wages are being paid. Nearly all railway companies are using all the rolling stock they have available during the rush-hour period. Consequently it is necessary to make repairs during the off-peak interval. Usually, cars cannot be placed in the shops until 9 or 9:30 in the morning, and they must be released by 4 o'clock in the afternoon. The real problem of stabilizing labor is to provide something for the men to do before the cars are placed in the morning and after they are released at night.

There is much work which can be done during these times, but unless a careful program is laid out in advance, there is a tendency for the men to loaf or work inefficiently. One large railway with a number of inspection shops uses the men in the mornings, before the cars are placed, for making up and repairing stock of the particular class that the men are familiar with. Thus the controller inspectors make contact tips,

**This is the issue in November that is devoted essentially to maintenance subjects**

put new springs on controller fingers, remove carbonization from arc deflectors which are suitable for use to replace defective parts, etc. The motor inspectors look over carbon brushes that can be cut to smaller dimensions for reuse, and they repair brush-holder parts and the like. Oilers sort waste, look after its soaking with oil and get the day's supply ready. Other inspectors do similar work.

Still another part of the problem of stabilizing labor is to provide for uniform employment of forces at different periods of the year. The practice of releasing men at certain seasons and hiring new ones at the period of greatest need does not work out efficiently, since the railways lose the benefit of retaining men of experience. Among shop forces, a schedule of painting and general overhauling can be so laid out as to fill out the period when men will not be required on other work, and so they will work more efficiently and at the same time a uniform force will be kept through the year.

The track and way departments of steam roads have found that new rails can be laid almost as efficiently during the winter as during the summer season, and so many steam roads are placing their orders for rails during the latter part of the year with the idea of using their forces on this work during the winter season when they could not work on other track maintenance repairs. As an example of this, it is reported that three-quarters of a million tons of rail already have been ordered since Sept. 1. This tonnage is much larger than has been ordered in the same period for many years past. Interurban electric railways might follow this practice to advantage.

Hiring men when work is heavy and laying them off when it is light has been found to produce serious losses to the companies as well as being unsatisfactory to the employees. The methods suggested here would be a step in the direction of overcoming the loss which necessarily accompanies a frequent turnover of labor.

## Better Maintenance at Lower Cost

THAT no maintenance situation is so bad that it is without hope was brought out forcefully in a paper by W. C. Bolt at the recent meeting of the New England Street Railway Club, which was abstracted in ELECTRIC RAILWAY JOURNAL for Nov. 8. Four years ago the situation on his road, the Eastern Massachusetts Street Railway, was deplorable. In July, 1920, a midsummer month, there were 1,489 equipment failures requiring removal of the car from service, or one pull-in for every 1,400 car-miles. The leading cause of trouble was hot bearings, with 339 failures, while air-brake troubles followed with 222 failures. Armature failures were altogether occurring at the rate of 500 per month.

Certainly such a record must have seemed almost hopeless. It represented a situation that had continued for years and had come to be considered in the same light as was the yellow fever by the inhabitants of the Canal Zone before American engineers got on the job—something that couldn't be cured and had to be endured.

While it must have been a huge task to overcome precedent and prejudice, the attempt was made, with the result that in September of this year there were only 104 maintenance pull-ins from all causes, or one for 14,500 car-miles—a record ten times as good as that in 1920. One large division even bettered this good record by running 75,000 car-miles per pull-in.

The skeptic can argue that any one can make such a record by spending enough in maintenance to keep the cars in first-class condition. The most surprising part of the story is that this good record has been obtained with a reduction in cost of maintenance per car-mile from 6.2 cents in 1920 to 3.54 cents this year—a total saving of more than half a million dollars.

Part of the saving has been due to the purchase of new cars with modern equipment, but a great deal has come from a better understanding of the work and the use of improved practices. Inspection is now made by meter inspection dials instead of in a haphazard manner, modern methods of armature and field coil repairs are used, and better oiling practices have been adopted. Welding is used for many important jobs. Painting is done frequently, but paint spraying has cut down the cost. The shop forces have been greatly reduced, the number of shop men dropping from 447 to 188 in the four years.

The record of this road is exceptional, but it is something that can be matched by any other road that is suffering from the same troubles. The use of modern practices, which is continuously being advocated by this paper, will give a like result wherever applied. It may even be bettered, for Mr. Bolt says that there is still room for improvement on his own property.

## California and Washington Reject Government Ownership of Utilities

WHILE the defeat of Senator LaFollette in the national contest was decisive, it is reassuring to know that his schemes of public ownership were not the only ones rejected by the voters last week. Government ownership was an issue at several of the state elections, notably in California and Washington.

The referendum in California was on a measure to bond the state for $500,000,000 to permit it to acquire, construct and operate hydro-electric generating and transmission systems. But the electorate spoke in no uncertain voice, turning down the measure by a vote of considerably more than 2 to 1. This is the second time within the last two years that such a plan has been voted down by the people in California—a good indication of common sense in that commonwealth.

In Washington, which was another state to declare itself in favor of private initiative for utility operation, the measure under consideration was known as the Bone bill, and its purpose was to permit the cities and towns in the state to buy and sell electric current both within and without their corporate limits and to acquire and construct electric generating and distribution systems. Naturally, those who realize the danger of such a policy pointed out its defects, and the vote was decisive against it. Even in the city of its birth, Seattle, the measure was lost. The voters in that city have already had a taste of what municipal ownership of utilities means and wanted to preserve the state at large from a similar experience.

Altogether, considered not only from the national point of view but also from the local point of view, there is not much in the results of the last election that should give encouragement to the advocates of government ownership.



Careful Planning Made Possible the Completion of This Job in a Short Time. The Steam Shovel, Steam Roller, Track Layers, Joint Welders, Grinders, and the Paving Gang Followed One Another in Close Order

# Rapid Track Reconstruction with Butt-Welded Joints

**Third Avenue Railway Tries New Butt-Weld Method of Making Joints on Large Replacement Job on Upper Broadway—Designed by Manufacturer to Facilitate the Work—This and Careful Organization Made Speedy Progress Possible—Easily Moved Crossovers Aided in Avoiding Interruption to Service**

ON A RECENT reconstruction job, the Third Avenue Railway, New York City, has been using the new electric butt-weld type of joint developed by the Lorain Steel Company. Prior to this installation by the Third Avenue Railway, butt-welded joints made under pressure were tried in Boston and in Philadelphia. About 500 joints were made in each place. In Philadelphia, the welding was done at the side of the street and long lengths of welded rail were then moved over into place in the track structure. In Boston, the procedure followed was substantially the same as that of the recent job in New York City, described here.

The reconstruction of 1½ miles of double track on Broadway from 242d Street to the Yonkers city line was undertaken when the city decided some time ago to repave the streets. The street here is part of the famous Albany Post Road and carries extremely heavy vehicular traffic. It was therefore desired that the period during which the street was torn up and closed to traffic be as short as possible. Railway traffic along this route also is heavy and the company wished to carry out the work with a minimum number of interruptions to service.

The old track structure consisted of 9-in. grooved girder rail L. S. Co. No. 323 on untreated wood ties with bolted joints. The new construction is with standard A.E.R.E.A. 7-in. 122-lb. grooved girder rail on new creosoted ties spaced 2 ft. on centers. It is estimated that the total cost of the work will be approximately $180,000.

On this section of upper Broadway the old track had been in service for many years and for some time the company had been considering its replacement. Actual work was not undertaken, however, until the city decided to repave the streets. The reconstruction was very carefully organized in order that it might proceed with the least possible delay. Work was carried on simultaneously from two points on the job, in the following manner:

The first step in the reconstruction was to cut the old rail by an oxyacetylene torch every 20 ft. throughout its length. This cut was made down to within a short distance of the base of the rail. After this had been done, cars continued to operate over the cut rail until the time came for it to be taken up.

Then a sliding crossover was placed at each end of the strip of track to be torn up. Special importance attaches to the use of sliding crossovers, because they permitted the operation of cars past the reconstruction work on a single track on comparatively short headway. The design of these crossovers is such that they can be moved easily from one location to another. This is done by fastening each side of the crossover to the rear of a work car. The cars are then moved simultaneously in the same direction, pulling the crossover behind them. Unless there is some obstruction in the center of the right-of-way between the tracks, the crossover can be moved without being taken apart. This process is much simpler than that of taking apart the usual bolted crossover, loading the pieces onto a car, conveying them to the new location, unloading them from the car, and putting them together again. The process of moving a sliding crossover is so simple

## Making Butt Welds on Third Ave. Railway

No. 1. Sliding crossovers of this type are so easily moved that the length of single-track operation was kept at a minimum.

No. 2. General view of welding operation. A second clamp is being adjusted to position, while the first is used in making a weld. Note oil torch attached to rear of car.

No. 3. Hydraulic pressure was used to bring the rail ends together, after molten borax was poured into the molds and the electric current brought the rails to the proper temperature.

No. 4. Appearance of the butt-welded joint before grinding. The bolt holes in the web of the rail play no part in this operation.

No. 5. It was found necessary in order to prevent cracking to heat the welded joint carefully before grinding.

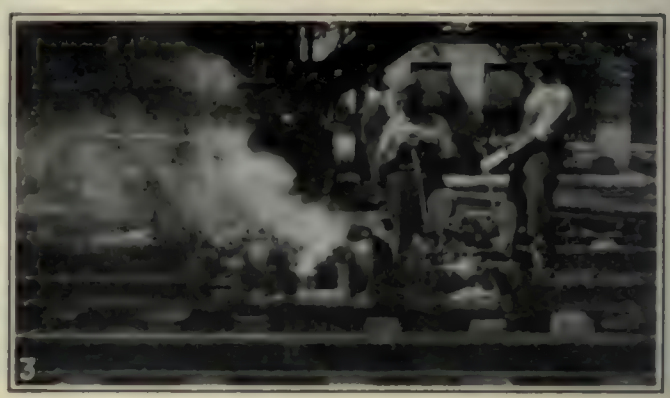
No. 6. This machine was specially designed by the Lorain Steel Company to remove the welding metal from the groove of the rail.

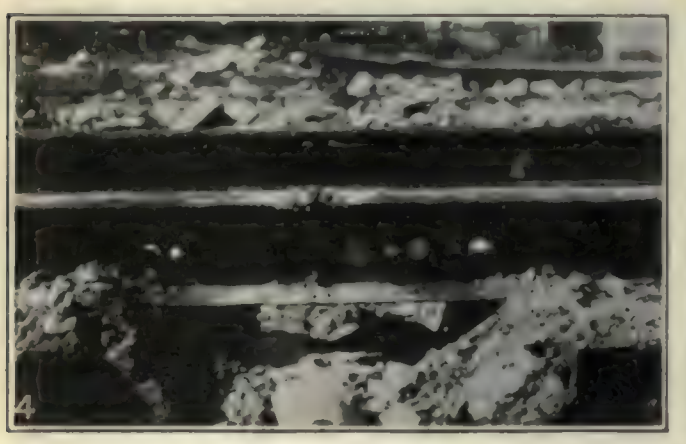
No. 7. Car equipped to grind down the head of the rail after welding.

No. 8. A man with an electric hand grinder finished off the edges of the joint.

















that the plan called for moving these every night and thereby made it possible to keep down to a minimum the length of single-track operation.

The old pavement and rail were taken up by steam shovels and loaded on to automobile trucks. Behind the steam shovels a gang of men with picks and hand shovels completed the job of preparing the subgrade, which was then thoroughly compressed by steam rollers. On account of the large number of small stones mixed with the soil in this locality, the ground after rolling has practically the qualities of a ballasted track foundation.

New creosoted ties were placed directly on the rolled earth. The new rail was then laid on the ties and loosely spiked. Because the rails are squeezed together during the welding operation, it was necessary to leave the rails loose enough so that they could be drawn into position for making the weld.

A powerful pressure clamp which is shown in an accompanying illustration was supported on rollers running on the heads of the rails. In making a weld the clamp was placed over the two rail ends and wedged firmly to them. The ends of the rails were kept separated about ⅜ in. and clay molds placed around them. These molds had previously been formed and then baked in an electric furnace located in one of the grinding cars. Into these molds was poured molten borax heated in another furnace in the welding car. Low-voltage electric current sent through the joint keeps the borax boiling and brings the rail ends to the temperature necessary for welding.

When this temperature is reached a pressure of 5,000 lb. per square inch is obtained by hand-operated hydraulic jacks, and the rails are pulled together with sufficient force to upset the ends and give a thorough weld. This process produces an excellent joint with only a small amount of superfluous metal to be removed from the head of the rail. The appearance of such a joint is shown in an accompanying illustration. Although there are bolt holes in the rail, these play no part in the process. The Third Avenue Railway customarily buys rail with such holes already made, and the usual rail was used on this job regardless of the fact that the bolt holes were not needed. All joints were post-heated before grinding. For this purpose an oil torch was used, operated by air pressure from the welding car.

The grinding of the joints was done in three steps. First, a large rotary grinder, that was virtually a planer, was used to make the head of the rail smooth. This was followed by another car specially designed by the Lorain Steel Company to remove the surplus upset metal from the groove of the rail. Finally, a workman with a small electric hand grinder went over the joint and put the finishing touches to it. One welding and two grinding cars were used and they followed one another in close order as the joints were made. Two sets of pressure clamps were used, one on each rail, the first being adjusted to position while the second was used in making a joint. Immediately behind the welding car came the first of the grinding cars to smooth the head of the rail. A short distance behind the second car came the third, equipped to grind the groove of the rail. To this third car was attached the hand electric grinder.

After the joints had been made, the space between the ties was filled in with the same mixture of dirt and rock that was used for the foundation. Tamping and back ramming of this material were all done mechanically by means of Ingersoll-Rand tie tampers.

The railway company's contract with the Lorain Steel Company called for an average of 18 joints per day, but on several days 30 joints were made in less than 9 hours. With 60-ft. rail this means close to 1,000 ft., or four city blocks, of track per day.

Under the laws of New York State, the railway company has the option of itself paving the area for which it is responsible or of allowing the city to do this work. In this case the city is paving the entire street from curb to curb, and the railway company employed the city contractor to excavate and prepare the railway area ready for laying the ties. Some hesitancy was felt by the municipal authorities in allowing the railway and the contractor to close the street altogether to vehicular traffic. It was pointed out, however, that by having the use of the entire area during the period of reconstruction it would be possible to perform the work much more quickly than could otherwise be done, and thereby reduce the total amount of delay to vehicular traffic.

## Paving Guards Used in Halifax

AN INTERESTING type of track structure has been used for the past two years by the Nova Scotia Tramways & Power Company, Ltd., Halifax. In streets where there are car tracks the city paving area extends to the end of the ties. At this point Godwin steel paving guards have been installed to separate the city paving from the railway paving, and to prevent the disintegration which in the past has occurred along this line.

The track structure itself consists of a 6-in. concrete base upon which is laid a 2-in. sand cushion. Hemlock ties 6 in. x 7 in. x 7 ft. are used. The rail is 60-lb. T Lorain section 263. Joints are of the continuous bolted type with six special hard carbon steel bolts per joint. Similarly a 6-in. concrete base is used for the paving with a 1-in. sand cushion. The surface is a 3-in. layer of asphalt.



Showing How Godwin Steel Paving Guards Are Installed at Halifax

The use of paving guards in Halifax has proved satisfactory and economical. Neither the action of the severe winter weather nor the pounding of heavy traffic has destroyed the edge of paving where these guards have been installed.

# Special Tools Facilitate Machining of Bearings

**By the Development and Employment of Many Special Tools the Twin City Rapid Transit Company Has Applied Production Methods to the Various Operations of Finishing Bearing Shells**

APPLICATION of modern production methods to the various operations connected with machining of axle and armature bearings offers many opportunities for substantial savings in time and costs. In the mechanical department of the Twin City Rapid Transit Company these various operations are laid out with a view toward the efficient use of special machine and tool equipment.

Both solid bronze and babbitt-lined malleable-iron axle bearings are used on this property. In general, it is the practice to use the babbitt-lined malleable type of axle bearing on those motors where the axle and bearing housing diameters are such that the thickness of the metal in the bearing shell is not less than $\frac{7}{16}$ in. to $\frac{1}{2}$ in. With this type of bearing, the malleable shell is lined with about $\frac{1}{8}$ in. thickness of babbitt, and the outside face of the bearing flange is also babbitted. When the motor and axle design do not permit the use of a bearing shell thickness of at least $\frac{7}{16}$ in., the solid bronze type of shell is used.



The Joining Surfaces of Axle-Bearing Shells Are Finished on a Surface Disk Grinder at the Rate of 180 Half Shells per Hour

### Special Tools Play Important Part

In machining both the solid bronze and the malleable shells, the operations are carried out by similar methods, with only such changes as are required by the difference in the materials and the design of the shell. In both cases the various processes are designed to give maximum production with minimum lost motion and handling.

The first operation in machining bronze axle-bearing shells consists in facing off the joining surface on each half of the shell. This is done on a No. 19 Besly surface disk grinder having a disk diameter of 53 in. Across the top of the machine frame two right-angled crossbars allow four groups of shells to be placed on the grinding disk simultaneously. Thus, as two halves are ground against each of the bars, a total of eight halves can be put on the machine at one time. The bearings are simply placed on the face of the grinder and their own weight is sufficient to dress down the flat joining surfaces. The man in attendance keeps the machine filled with bearings and checks the dimensions of those that have been ground so as to make them each as nearly a perfect half as possible. This operation is completed by one man at the rate of 180 half shells per hour, or 90 complete bearings.

After the joining surfaces are finished the next operation is to bore out the interior of the shell. This is done in a horizontal boring mill. A split fitting fastened to the bed of the machine is arranged so that the two bearing halves are securely held together when the cap bolts shown in an accompanying illustration are pulled down. A through boring bar is used and the operation is completed in one cut. The bar is adjustable vertically in the heads of the machine, and by this adjustment the cut is taken exactly in the center of the shell.

### Two Halves Stamped to Correspond

Before the bearing is removed from the boring jig, the two halves are stamped with corresponding numbers, so that they will be kept together during subsequent operations. The next of these is the operation of facing the outside of the flange and rounding the edge connecting this face and the inside bore. This is done in a Warner and Swasey 2A turret lathe. The two halves of the bearing are held together on a mandrel by means of an outside clamp ring. The solid ring is slipped over the bearing, and the two halves are held tightly against the mandrel by means of a setscrew. To accommodate bearings of various sizes of internal bore, special sleeves to fit each different size of bearing are provided for the mandrel. The set-up for this operation is shown in an accompanying illustration.

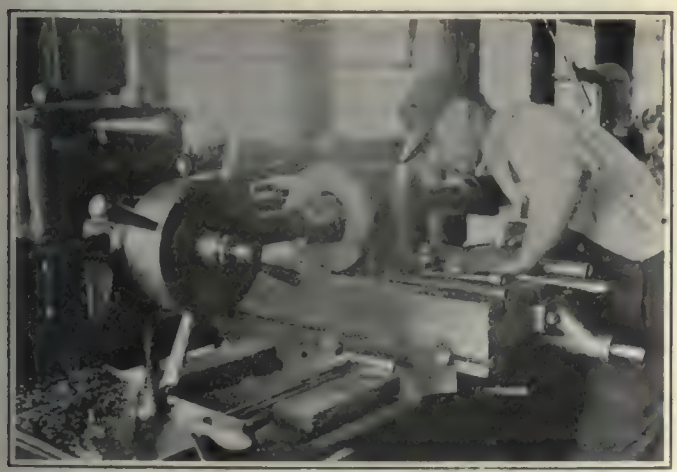
In the next operation the remainder of the outside

of the bearing is finish turned. The two halves are again held on an arbor, but in order to allow the outside circumference to be finished without turning the bearing around to complete the cut, the arbor is arranged so that a clamping nut forces a disk against the end of the bearing and clamps it tightly against a collar on the end of the arbor. Both the disk and collar have knife edges which are forced against the bearing, so that these edges grip the shell and effectually hold the two halves in place. The collar at the flange end is large enough so that its knife edge clears the fillet and bites into the face of the flange. The edges on the disk at the small end of the bearing bite into the metal at the end of the shell. The collar at the large end is a permanent part of the arbor spindle, while the disk at the small end is free to slide on the spindle as the nut on that end is pulled up.

The fifth and last operation in finishing these shells consists of drilling and countersinking the dowel-pin holes. These are located by means of a jig which consists of a large sleeve into which the two bearing halves are placed, so that the split between the two halves corresponds to a scribe mark on the jig. This brings the dowel-pin holes in their proper location.

### Similar Operations on Malleable Shells

Malleable-iron shells are finished in the same general manner as the split bronze type, except for such variations as are incident to the difference in material and design. The joining surfaces of the two halves of the malleable shells are finished on the surface grinder in the same way as described for the bronze shells. The malleable-iron castings, however, have babbitt retaining grooves cast into the inside surface, and this requires an additional operation of grinding the fins from the edges of these grooves.



**While the Two Halves Are Held in a Split Jig, the Interior Bore of Axle Bearings Is Finished in One Cut**



**A Clamping Ring on the Outside Holds the Two Halves of Axle Bearings on an Arbor While Facing the Flange**

The operation of finishing the face of the flange, and rounding the inside edge, is carried out similarly to the corresponding operation on the bronze shells. In addition, however, a dovetail groove is turned in the face of the malleable flange, to help in retaining the babbitt that is put on this face to take end thrust wear.

After this is done, the small end of the bearing is faced off to remove the fin and square up the end surface. The same type of arbor and clamp that was described for facing the flanges on bronze shells is used for this operation, except that a pin on the arbor projects through the bearing window and helps to drive the casting. This pin is found necessary to keep the shell from slipping on the arbor due to the drag of the heavy cut that must be taken from a rough malleable casting. The pin is not used for finishing the bronze material, as in that case the grip of the outside clamp ring is ample to prevent the bearing from turning on the arbor.

Turning the outside of the bearing to make it fit in the motor housing is the fifth operation on malleable shells. This work, together with that of finishing the inside face of the flange, is performed in the lathe while the bearings are held in place on an arbor by gripping disks on the ends in the same way as was described for bronze bearings. In order to get a firm grip on the harder malleable material, the loose disk is pulled up as tightly as possible with the nut on the arbor and is then rapped with a small hand mallet and the nut again pulled up tight. The next step is to bore out the inside to the proper size after babbitting.

First the surplus babbitt is removed with a coarse file and the mating surfaces are carefully smoothed up so that the bearing will fit into the boring chuck. This is an eccentric clamp chuck and was specially designed for this boring operation. The construction is shown in an accompanying illustration. It will be noted that the body of the chuck consists of a solid steel cylinder. Four heavy pins pass through this cylinder near each end, and are spanned on the outside by two clamping rings, arranged with tapered surfaces in contact with the outside ends of the pins. When the rings are turned through a short distance, the pins are forced in against the bearing and hold it securely in the chuck. The design and arrangement is such that the bearing is accurately centered, thus insuring that the finish bore through the babbitt will be exactly concentric with the shell. The far end of the chuck in the illustration is threaded to fit the headstock spindle of a turret lathe.

With the bearing thus mounted in the turret lathe, the interior bore and the facing operation on the flange are performed at one setting. The short boring tool is carried in the turret, and the facing tool is mounted in the tool post. This facing tool is carefully squared up with the flange, so that the finish cut is made by simply bringing the tool against the face of the flange with the longitudinal hand feed on the machine. The end of the facing tool is hook-shaped as shown in the accompanying sketch, and by moving



The Outside Is Turned and the Inside Face of the Flange Is Finished in This Set-Up




Above, Arbor for Set-Up Shown at the Left. The Two Halves Are Held by Disks Which Clamp Against the Ends

the tool out with the lateral hand feed, the inside edge is quickly finished in practically the same operation as that of facing the flange. The inside bore is finished so that the bearing will just fit a standard plug that is used for checking the size.

On the malleable bearings, as in the case of the bronze shells, the last machining operation consists of drilling the dowel-pin holes. This is done in a jig which is very similar to that described for drilling the bronze shells.

### Armature Bearing Operations Simplified

All armature bearings consist of bronze shells cast in one piece, which in some respects lend themselves more readily to efficient machining than is the case with the split shells used for axle bearings. The casting is first chucked by the small end in an independent jawed chuck, which allows the piece to be readily centered in a lathe. With this set-up in a turret lathe, the interior is bored and the outside face of the flange is finished. A ring $\frac{1}{16}$ in. deep and $\frac{1}{8}$ in. wide is cut into the inside bore of the bearing shell about $\frac{1}{2}$ in. from each end, to help hold the babbitt lining in place.

The bearing is next slipped on an expanding mandrel for finishing the outside. This special tool consists of a center spindle having a taper of $1\frac{1}{4}$ in. per foot, and an expanding sleeve that grips the inside of the bearing. Cast-iron sleeves are made up in various sizes to fit the different-sized bearings. A longitudinal slot about $\frac{1}{8}$ in. wide is cut clear through the sleeve on one side, and two slots about $\frac{1}{16}$ in. wide are cut into the outside face to within about $\frac{1}{4}$ in. of the inside bore of the sleeve. The three slots are equally spaced about the circumference, so that the sleeve can expand when it is forced onto the tapered spindle of the mandrel. A large nut on the small end of the spindle is threaded right hand on the inside and also has a long shoulder which is threaded in the same direction on the outside. Although both the inside and outside threads on this nut are right hand, those on the inside, which fit corresponding threads on the end of the mandrel spindle, are pitched 12 to the inch, while those on the outside are pitched six to the inch. These outside threads fit corresponding threads on the inside of one end of the expanding sleeve. Consequently, when the nut is screwed to the left it forces the sleeve up on the tapered spindle at a rate corresponding to the difference in pitch between the inside and the outside threads, and when the nut is screwed to the right it pulls the sleeve off the taper at the same speed.



The Hook on the End of This Facing Tool Finishes the Inside Rounded Edge Immediately After the Babbitt on the Face of the Flange Is Finished




This Special Chuck Centers the Finished Malleable-Iron Bearings So that the Final Bore in the Babbitt Can Be Made. The Outside Rings Force Pins Against the Shell and Hold It Securely



Expanding Mandrels of Two Types Are Used for Holding Armature Bearings While the Outside Is Being Finished. Left, Mandrel Used in Turret Lathe. Right, in Engine Lathe

A short keyway extending for about 3 in. from the shoulder near the small end of the spindle forms a guide for a short pin projecting from the inside face of the sleeve, and serves to keep the latter from rotating as the nut is turned in either direction.

This expanding mandrel has a large head at the opposite end from the adjustment nut just described, and is threaded on the inside to fit the threads on the turret lathe headstock spindle.

### Also Designed for Engine Lathe

When the available turret lathes are crowded with work, it is sometimes necessary to finish armature bearings in an ordinary engine lathe. Under these conditions the work must be done between the centers of the lathe, and a somewhat different type of expanding mandrel is used to hold the bearings. In this type of mandrel a nut is provided on each end, one to force the sleeve on the tapered spindle, and the other to force it off. A keyway the entire length of the spindle keeps the sleeve from turning as it is forced on or off. Although the construction of this type of mandrel is somewhat simpler than the one previously described, the turret lathe method is used whenever machines are available, because it is necessary to remove the mandrel from between the centers of the engine lathe each time a bearing is to be put on or taken off. The entire outside surface of the bearing is finished on one or the other type of mandrel in one operation.

Dowel-pin holes or keyways, depending on the method of holding the bearing in the motor head, are next put in.

After the shell has been babbitted, the last operation consists of boring the babbitt lining to size. This is done on an engine lathe equipped with a universal chuck and a special tool post, which enables a boring bar to be used in the lathe.

# New Chicago Multiple-Unit Cars Have Automatic Exit Doors

**These New Type Cars of the Chicago Surface Lines Are Designed to Give Maximum Flexibility Either as Single Units or in Two-Car Trains — They Are Arranged for Double-End Operation and Are Equipped with Two 65-Hp. Motors per Car Mounted on Maximum Traction Trucks**

A GROUP of 100 new cars for the Chicago Surface Lines on which preliminary specifications were announced in the issue of ELECTRIC RAILWAY JOURNAL of April 12, 1924, are rapidly nearing completion. Some of the cars have already been put in service and it is expected that the entire lot will be on the street in regular operation before the Christmas holiday period.

Although the design of this latest addition to the rolling stock equipment of the Surface Lines utilizes many structural features common to other groups of cars built by that property within the past few years, a number of interesting innovations are also incorporated. These include the use of G.E. type M multiple-unit control with two motors per car and maximum traction trucks, and an unusually flexible arrangement of pneumatic door control in which the exit doors are automatically operated by alighting passengers. A similar type of automatic exit door control was installed on a group of 45 double-truck, one-man cars described in the ELECTRIC RAILWAY JOURNAL of Sept. 30, 1922, which have now been in service for a period of more than two years. This latest design, however, represents an extension of the use of the automatic device to cars for service in congested districts either as single units or in multiple-unit trains.

A substantial saving in weight and cost in comparison with four-motor equipment was obtained by the use of two GE-275, 65-hp. motors per car mounted on Brill 39-E maximum traction trucks. The selection of this type of motor equipment instead of four smaller motors per car was also influenced by the desire to obtain rugged, comparatively low-speed machines for the severe service conditions encountered in Chicago. Such equipment gives large-size armature shafts, gears and pinions, and makes the motor parts interchangeable with those used on other groups of cars constructed within the past few years.

Multiple-unit control gives these cars maximum flexibility and permits single units to be operated during non-rush periods and to be readily coupled on the street into trains for rush-hour service without serious delays. Double-end equipment permits them to be operated on lines having stub terminals. Tomlinson automatic car and air couplers facilitate coupling and uncoupling on the street, but the electrical connections between cars are made with flexible jumpers. This application of multiple-unit control marks a further extension of train operation in Chicago, which for a number of years has been carried out with motor cars and center-entrance trailers.

### Maximum Speed in Loading and Unloading

National Pneumatic door-control equipment is arranged to give maximum speed of loading and unloading in either street or subway operation. The door and car control are interlocked to prevent starting with the doors open, and full Safety Car Devices apparatus is also used. Single-car units will be operated by two men. In trains of two cars there will be three men, two on the front car and one on the front end of the rear car. In either direction of operation, the doors at the rear end of each car may be con-



The New Chicago Surface Lines Cars Have Multiple-Unit Control and Are Arranged for Operation Singly or in Trains of Two Cars. Streamline Effect in the Body Gives It a Graceful Appearance

trolled by an operator on either platform, or by street collectors. This allows the rear door of the second car in a train to be opened and closed by the conductor stationed on the front platform of that car or by a man on the street supplied with a key to fit the door-control valve located on the outside near the rear door. The automatic exit doors are located on each platform as shown in the accompanying plan drawing, and those at the front end of each car are operative when the train is moving in that direction.

One of the principal features of the arrangement of doors when the cars are operated in trains is the grouping of the entrances at the center of the train. In other words, passengers enter the front car at the rear end and leave this car at either the rear or the front end, while they enter the rear car at the front end and leave at the same end. When street collectors are available, passengers may also be allowed to enter or alight from the rear end of the second car. This arrangement for loading both the front and rear cars at one point in the center of the train is expected to give more uniform distribution of passengers between the two cars than is obtained where the points of boarding the two cars are separated, as in the case of a rear loading motor car and a center loading trailer. In addition, this design is expected to avoid the delay and confusion resulting from passengers trying to board the train at two different locations.



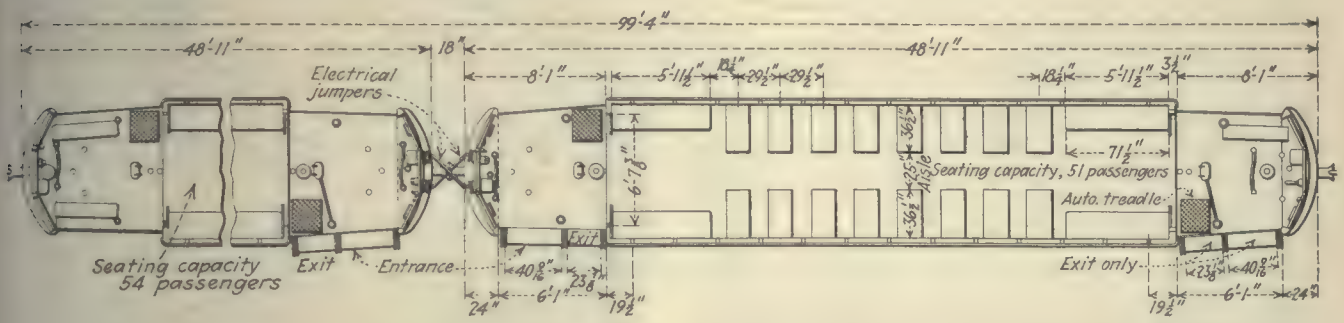
Simple Lines and Smooth Curves with the Dull Finished Cherry Trimming Feature the Interior of This Car. The Wide Aisle Facilitates Passenger Movement.



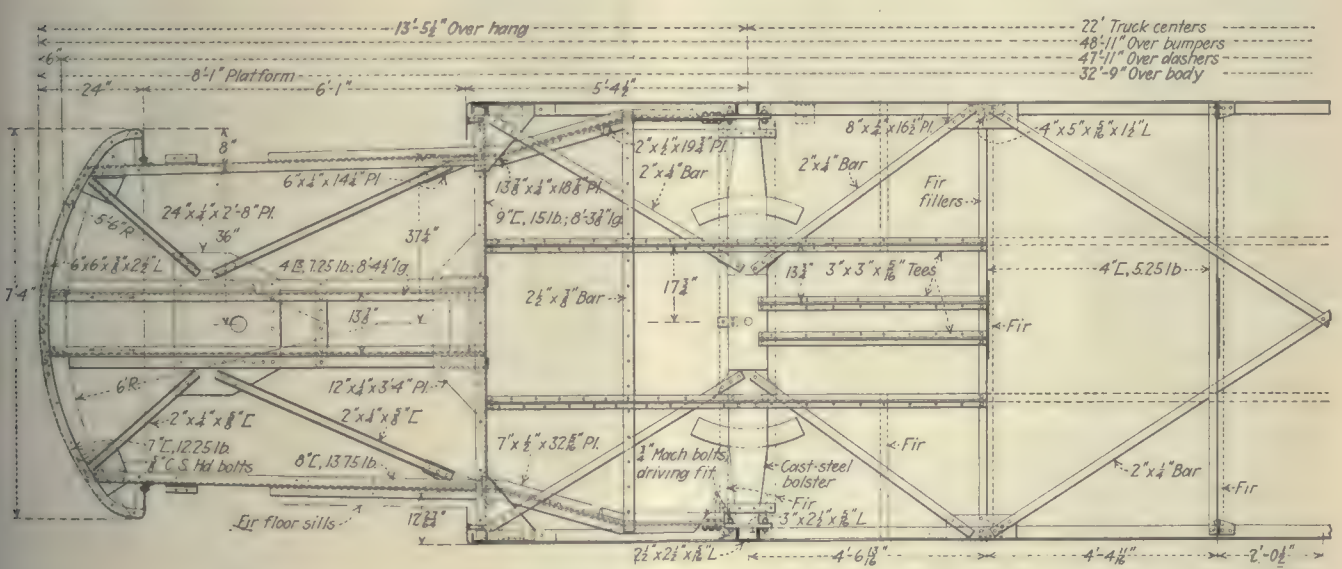
The Automatic Exit Doors Are Controlled by a Treadle in the Platform Floor. Passengers Board Through the Door at the Right and Leave Through the Automatic Exit.

The new cars were designed completely by the engineering division of the shops and equipment department of the Surface Lines under the direction of H. H. Adams, superintendent of shops and equipment. Fifty cars are being constructed in the West Shops of the company and the remaining 50 are being built to Surface Lines specifications and drawings by the Light-Weight Noiseless Electric Street Car Company in St. Paul, Minn. The two groups are identical in construction and all parts of the equipment and structure are being made as nearly interchangeable as possible to facilitate maintenance and repair. The general appearance corresponds with the arch-roof cars now in service on the Surface Lines and, as in former groups of cars, careful attention has been given to the matter of improving the appearance by giving the body a streamline effect.

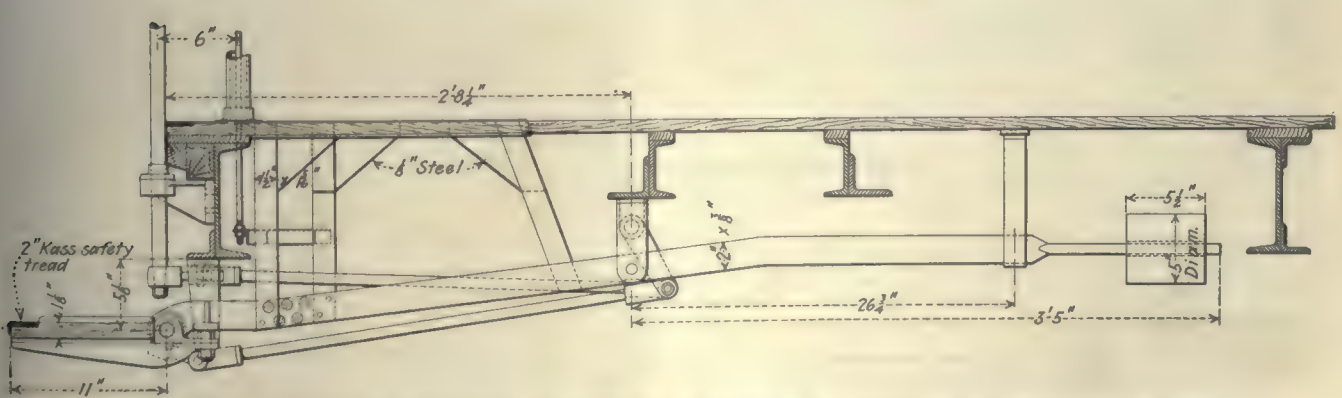
Minimum weight consistent with the severe service conditions encountered was another objective in the design. The complete cars weigh 41,000 lb. each. This weight is distributed between car structure and equipment as follows:




**The Front Car of a Two-Car Train Seats 51 Passengers and the Rear Car Seats 54. Automatic Couplers Connect the Air Line, but the Electrical Connections Are Made with Jumpers**




**The Underframe Is Designed to Withstand the Severe Conditions Encountered in Chicago Service and Also to Meet the Requirements of Train Operation**




**The Treadle Mechanism for Controlling the Automatic Exit Door Is Connected with the Step so that the Door Remains Open Until the Alighting Passenger Steps Off to the Street**

| | Pounds |
|---|---|
| Car body | 14,100 |
| Trucks without motors and gears | 11,280 |
| Motors and gears | 5,000 |
| Electrical equipment | 3,100 |
| Air brakes, hand brakes, door equipment, couplers and piping | 5,250 |
| Body and vestibule seats | 1,350 |
| Sign boxes, register equipment, curtains and miscellaneous accessories | 920 |
| | 41,000 |

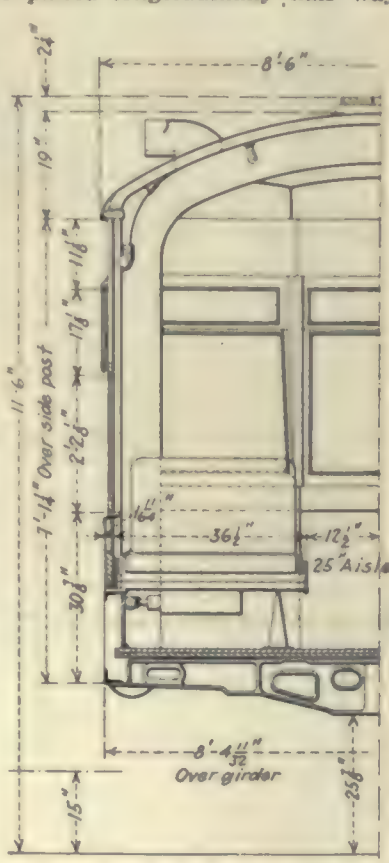
The general dimensions are shown in the tabulation below:

| | |
|---|---|
| Length over bumpers | 48 ft. 11 in. |
| Length over corner posts | 32 ft. 9 in. |
| Width over all | 8 ft. 6 in. |
| Seating capacity, first car | 51 |
| Seating capacity, second car | 54 |
| Width of aisle | 25 in. |
| Door opening in clear, rear entrance of front car and front entrance of rear car | 40 in. |
| Door opening in clear, rear exit of front car and front exit of rear car | 23½ in. |
| Door opening in clear, front exit of front car | 62 in. |
| Height, rail to trolley board | 11 ft. 6 in. |
| Height, rail to floor | 37½ in. |
| Height, rail to side sill | 31½ in. |
| Height, rail to step | 15 in. |
| Height, step to platform | 13½ in. |
| Height, platform to body floor | 8½ in. |
| Side-post centers | 29½ in. |
| Truck wheelbase | 4 ft. 10 in. |
| Truck centers | 32 ft. |

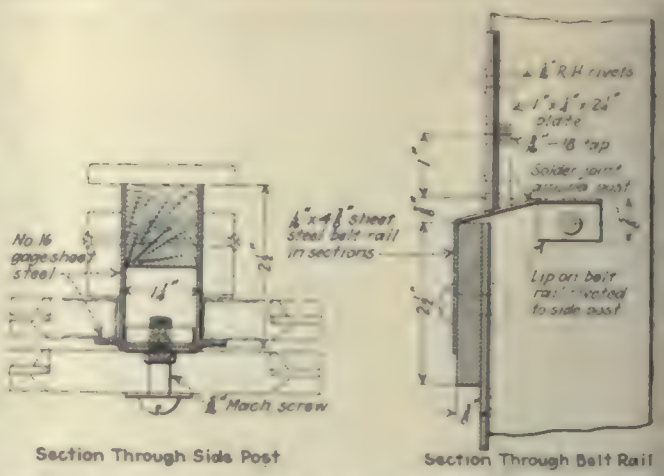
American Electric Railway Engineering Association standard parts and recommended dimensions have been used as far as possible throughout the body structure and equipment.

The side girder plates are made of No. 12 gage steel. Each side is reinforced at the lower edge with 3-in. by 2-in. by ⅜-in. angles and at the top edge by the belt rail, formed of ⅛-in. sheet steel and further reinforced with a 2½-in. by ⅜-in. bar. Seat support angles 1½ in. by 1½ in. by ⅜ in. are placed longitudinally half way between the bottom and top edges of the girder and are cut for the side posts. These are formed of ⅛-in. sheet steel and correspond in design to the side posts used in the group of 45 one-man double-truck cars described in detail in this paper, issue of Sept. 30, 1922.

Drop-type platforms are carried on 8-in., 13.75-lb. channel platform knees, reinforced at the point of greatest stress by web plates and angles. Bumpers are 7-in., 12¼-lb. channels with the flanges turned in. The end sills consist of 9-in., 15-lb. channels secured to the side structure with gusset plates. Channels are used for the main body cross-sills and are of 4-in., 5¼-lb. section. The underframe is rigidly braced with diagonal members, as shown in the accompanying drawing of the construction of this part of the framing.




Cross-Seats Are 36½ In. Wide, and for an 8-Ft. 6-In. Over-all Width an Aisle Width of 25 In. Is Obtained by Making the Wall Thickness Below the Belt Rail Only 1 11/64 In.




Pressed-Steel Side Posts Are Used. The Belt Rail of Pressed Steel Is Reinforced with a Flat Bar at the Upper Edge of the Side Girder

A combination of flat steel and wood carlines is used to support the roof in a manner similar to that which has been standard construction with the company for several years. The roofing material is ¼-in. Haskelite and the headlining is ⅛-in. Agasote. Other details of the body structure and framing are very similar to a former group of 169 cars described in this paper for Sept. 8, 1923.

Car wiring both for control and auxiliary circuits is carried in "Duratube" except where exposed to abrasion or direct wheel wash, where it is put in aluminum conduit. The main motor cables are inclosed in "Duratube," cleated under the center of the car floor. The floor is carried continuously between trapdoors for a space about 8 in. wide, and this allows the cables to be carried past the trapdoor openings with no special provision for extra protection at this point. Aluminum motor junction boxes are used, and the heater wiring

SPECIFICATIONS FOR THE NEW CHICAGO MULTIPLE-UNIT CARS

| | |
|---|---|
| Air brakes | G.E. CP-27, 16 cu.ft. capacity |
| Compressor | G.E. Type |
| Control | G.E. Type M light-weight |
| Trucks | Brill 39E-2x, maximum traction |
| Roof | ¼-in Haskelite covered with No. 8 National prepared roofing |
| Headlining | ⅛-in. Agasote |
| Interior trim | Cherry, stained dark with rubbed finish |
| Signal bell | Consolidated single stroke bells |
| Buzzers | Consolidated |
| Trimmings | Statuary bronze |
| Center bearings | Surface Lines standard plain type |
| Side bearings | Stucki |
| Conduits | Duratube and aluminum |
| Couplers | Tomlinson automatic car and air |
| Curtain material | Fabrikoid, double faced |
| Curtain fixtures | Railway Supply & Curtain Co. No. 30 "Duquad" |
| Destination signs | Hunter illuminated |
| Door-operating mechanism | National Pneumatic with interlocking control and automatic exits |
| Wheelguards | H-B Lifeguards |
| Hand brakes | Pittsburgh No. 35, drop handle |
| Hand straps | Rico sanitary No. 7 |
| Heater equipment | Consolidated |
| Headlights | Trolley Supply—Surface Lines standard |
| Meters | Economy |
| Motors | Two G.E.-275, 65 hp |
| Paint | Chicago Varnish Company and vitrolite enamel |
| Rails and stanchions | Aluminum |
| Registers | International R-7 and B-13 backs |
| Sand traps | Electric Service Supplies |
| Sash construction | Wood with brass channel on sides |
| Sash fixtures | O. M. Edwards with lock on one side of sash and compression brake on opposite side |
| Seats | St. Louis |
| Step treads | Kass |
| Thermostat | Railway Utility |
| Trolley catchers | Trolley Supply |
| Trolley base | U.S.-14 |
| Trolley wheels | Railway standard 5-in |
| Ventilators | Railway Utility with compensating intakes |
| Wheels | 28-in. and 21-in., rolled steel |
| Window wipers | Railway type, hand operated |

long the truss plank on the interior of the cars is carried in aluminum conduit.

In one sample car of this group "Romex" cables and wiring were used. In this installation the insulated conductors are inclosed in fabric covering woven directly over the conductors and then coated with flameproofing and waterproofing compound. This type of wiring was put in to obtain more experience with this material, which is believed to come within the tentative rules for car wiring presented by the 1924 A.E.R.E.A. committee on car and carhouse wiring.

Complete specifications for materials and equipment used on these cars are given in the table on the preceding page.

# Thermit Process Gives Good Results in Youngstown

**This Method Is Used in the Installation and Repair of Crossings, Switches and Mates, Compromise Joints and Other Special Work—It Has Been the Standard of the Company Since 1916**

*By D. J. Graham*
Engineer of Maintenance of Way Youngstown Municipal Railway, Youngstown, Ohio

DURING the past eight years, approximately, 8,000 thermit-welded joints have been installed by the Youngstown Municipal Railway and to date only seven joints have failed. From investigation of the failures it was found that in most cases the break was due to faulty pouring, improper preheating of rails, or neglect in setting the mold boxes in the center of weld. In 1916 thermit-welded joints were adopted as standard practice for all types of new track construction. At first this method of welding was used for joints only, but gradually it has been developed to a point where it is used for other purposes, such as repairing switches, crossings, compromise joints, and other special trackwork.

An example of its efficiency in this respect is the repair work recently performed on a mate of solid cast-steel construction. A 12-in. piece of guard rail on the point end of a mate broke out, and as the mate itself was only partly worn, it was decided to make repairs on the job. The mate was cut off back of the break and a new piece of guard rail butted against the remaining end and welded to it by the thermit process. This was done during the night when service was suspended and was completed at a very reasonable cost. An additional life of approximately 5 years resulted. The accompanying itemized tabulation of the cost of the job shows the economy of performing this work in the street.

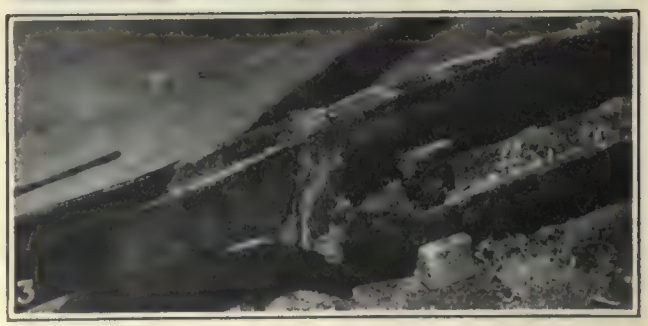
COST OF REPAIRS

| | |
|---|---|
| Labor (One foreman, 70 cents per hour; one helper, 66 cents per hour; one truck driver, 50 cents per hour) | $ 7.00 |
| Welding, sand and wax | .45 |
| Thermit metal | 13.85 |
| Gasoline for preheating | .30 |
| Power for preheater and grinding | .85 |
| Gas and oxygen for cutting | .35 |
| Brick, sand and cement | 1.85 |
| 18 in. of second-hand guard rail | .65 |
| Total cost | $25.30 |

This type of reconstruction work is used in repairing frogs and switches with the same economical results. Fig. 1 shows a switch that was taken out of the scrap pile, repaired with the thermit weld, and placed in a diamond turnout where the old switch went to pieces. This repaired switch is now in service and will probably last for two or three years. Other examples of special applications of thermit welds are shown in Figs. 2 and 3, which illustrate the side and bottom views of a switch which was broken through the casting. These indicate how the weld was placed at the break uniting the two ends and making the switch casting as solid as originally. Ordinarily this piece of special work would have been scrapped, but instead it was repaired in the shop and placed in use at another location.





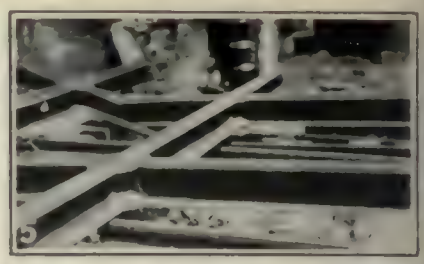


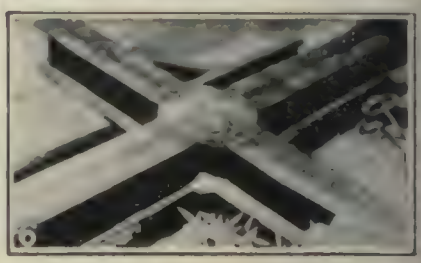
**How Switches Are Repaired**

No. 1. Broken switch repaired with thermit weld.
No. 2. Side view of switch casting repaired with thermit.
No. 3. Bottom view of the same switch casting showing filled out break in casting.

In addition to repair work, thermit welds are used on all new crossing work. On a double-track crossing made







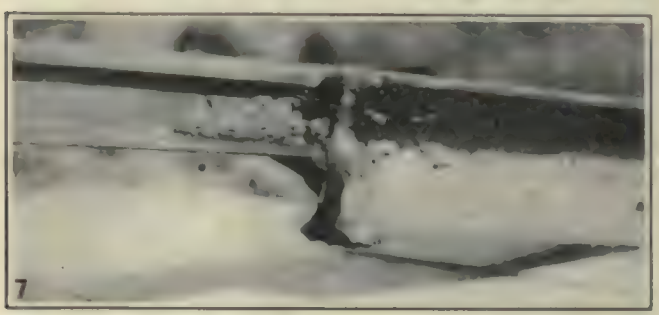
**Examples of Thermit-Welded Special Work**

No. 4. Thermit-welded frogs installed at single-track double-track crossing. No. 5. Top view of crossing, showing weld at rail intersection and flangeways built in by arc welding to give continuous flange bearing. No. 6. Bottom view of same weld showing continuity of joint and clean appearance.

with Lorain Steel Company's rail section 132-440, the frogs were welded into position by means of thermit metal. Intersections of the flangeways were built up with an electric arc welder and ground with a rail grinder so as to make a taper flange bearing over the intersection. A crossing of this kind installed more than three years ago is in perfect alignment and rendering good service today.

A similar crossing was built of Lorain Steel Company's rail section 103-478 with the frogs built up of thermit metal. In this case the flangeway of the crossing was built up with arc welding in order to make a continuous flange bearing over the entire crossing. Figs. 5 and 6 show a top and bottom view of this crossing, illustrating the manner of welding and the uniform appearance of the bottom and top of the rail.

All compromise joints are made by means of the thermit process. This type of construction is shown in Fig. 7. Other illustrations of compromise joint welds are shown in Figs. 8 and 9. A finished joint which has not been ground and needs no grinding on account of the perfect surface and gage alignment retained in making the weld is shown in Fig. 10. Renewing plates, tightening of bolts, broken bonds, and building up cups, are items of expense that do not exist with welded compromise joints, but which are important where other methods are used. The original cost of the two types of joints is approximately the same.









**Compromise Joints Made by Thermit Process**

No. 7. Compromise joint from L. S. Co. 90-206 to 70-lb. A.S.C.E. T-rail.

Nos. 8, 9, 10. Compromise joint between L. S. Co. rail sections 103-478 and 73-291.

## Careful Installation Is Important

Thermit welds are used on both Lorain Steel Company's rail sections 132-440, 9-in. rail and on 103-478, 7-in. rail. An inspection of joints installed seven years ago which had developed a few small cups afforded an indication of how faulty workmanship in placing the metal has a detrimental effect on the life of the joint. On this particular piece of track, the regular man doing the original grinding had been replaced by another. After grinding through the cupped section, it was discovered that improper grinding had been done at the time the joint was installed. This was thought to be the cause of the failure of the joint. Where the work of preparing and welding the joint and finishing is carefully done long service may be expected.

---

Of the 4,500 buses owned by the London General Omnibus Company about 7 per cent are normally out of service—5 per cent for the daily inspection and greasing, and 2 per cent for accidents and annual overhaul.

# Chicago Surface Lines Reroutes 1,600 Cars

## Widespread Changes in Schedules and Operating Routine Required by Adoption of New Plan to Relieve Congestion — Public Advised by Liberal Use of Paid Publicity

TAKING the lead in the attempt to relieve the notoriously congested conditions in Chicago's business district, known generally as the "Loop," the Chicago Surface Lines has put into effect a complete rerouting plan for its cars. This plan, which was described and discussed in detail in the ELECTRIC RAILWAY JOURNAL of May 3, 1924, page 683, is the result of more than a year of study on the part of engineers representing the city, the companies and the Illinois Commerce Commission. The detailed plan was submitted to the local transportation committee of the Chicago City Council in the form of a report by its transportation engineer, Major R. F. Kelker, Jr. The final rerouting by the Surface Lines was put into effect by an order from the Illinois Commerce Commission and was carried out a month in advance of the requirements of the order.




Type of Sign, Mounted on Standards, Used at Important Intersections to Advise Passengers of Changes in Routes




Close-Up View of the Sign and Stanchion Used in Chicago

Approximately 1,600 cars on 35 different lines are affected by the changed routing. Sweeping revisions of schedules, transfer of cars between terminals, increases in the number of cars assigned to some terminals and decreases in others, transfers of men between terminals, changes in switches throughout the loop district, more than $100,000 of additional trackwork in the form of new loops to eliminate stub terminals and instruction of men to make them familiar with new routes have been some of the widespread operating problems to be solved in connection with the change.

In general the new routing is based on the elimination, as far as practicable, of traffic interference due to the turning movement of street cars in the business district. Left-hand turns were considered to be most objectionable, since each such turning movement temporarily interferes with traffic in both directions. Right-hand turns were considered next objectionable because such turns temporarily interfere with two lanes of traffic. Straight crossings, of course, offer the least interference.

The new plan combines certain lines so as to furnish additional through routing, removes unimportant lines from the business district and eliminates turning movements in this district by bringing cars in on one street and out on another, completing the loop outside the business district. North-and-south lines are carried through the business district before making loops. Not only are turns in the business district eliminated in this way, but a largely increased service is furnished between the north and south boundaries of the business area.

Dearborn Street, which has never been a through street for north-and-south lines, has been made a turning street for lines to and from the west side of the city. This has made necessary the use of a walking transfer between these west side lines and the north and south lines on State Street.

In addition to the track changes outlined in the previous complete description in the JOURNAL of the proposed new routing, many changes in switches in the loop area were required. This included changes to approximately 100 mechanical switches, the removal of 25 electric switches and the installation of 21 electric switches in new locations. Lever type switches were installed at all points facing crossings with straight track.

Trainmen were supplied with maps and folders some time in advance of the change and were told that it would be necessary for them to be able to pass an examination on the new routes, so that they would be qualified to answer questions on the part of the public. In addition, those men who were assigned to new through-route runs which would take them into unfamiliar sections of the city were required to ride over the proposed new route and to sign registration books at the terminals at the far end of the line, indicating that they had completed the trip. Special instruction was given to men newly assigned to service on runs making trips through the tunnels under the Chicago River, in order to make them familiar with the rules for such operation.

Approximately 140 men were voluntarily transfered between stations because of changes in car assignments. Under the labor agreements existing in Chicago, this meant the sacrifice of seniority rights for picking run assignments, on the part of these men. Schedules on all the affected lines were completely remade and were placed in the hands of division superintendents in time to allow men to pick new runs and receive proper instruction relative to the new routes.

Three million folders giving the details of the new routes were distributed direct to the public through folder pockets in the cars, hotels, banks, department stores and large industrial and commercial institutions in the city. Printed maps showing in detail the exact routing of each line through the business district were supplied to trainmen and other employees, to traffic officers of the city and to others interested in the details of the new routes. These maps were also furnished to the public on request.

In addition to this directly distributed material, cards were carried in all cars calling attention to the proposed changes in routing. A list of the changes was published in paid advertising space in all the metropolitan newspapers and in the daily foreign language press.

Thirty standards carrying conspicuous signs were placed at important intersections in the business district to direct passengers who had not become familiar with the changes through the other publicity material issued.

A total of 5,847 right-hand turns in the business district per day have been eliminated. Also, 5,381 left-hand turns and 988 stub terminal movements have been done away with. It is estimated that intersection interference between street cars has been reduced 27 per cent.

The complete change-over was made at midnight on Sept. 13. Plans had been carefully laid in advance and all instructions issued so as to make the changes with the minimum confusion. At this time the necessary changes in the connections of electric switches were made.

The final success of the new routing in reducing traffic congestion depended on subsequent regulation of other traffic movement. The Chicago Association of Commerce, as the result of studies made by its traffic committee, took official action in favor of eliminating both turning movements and parking of automobiles within the congested area in the business district. It has been pointed out by the Surface Lines that its cars constitute only 10 per cent of the number of vehicles using the streets of the business district, but that they carry more than 75 per cent of the people who ride in this area. It was contended, therefore, that the full benefit of the new plan in improved service, as well as the elimination of congestion and danger to pedestrians, could only be realized with the similar scientific routing of other vehicles using the streets.

A short trial period with the new routing of cars convinced the city authorities that an even greater improvement would be obtained by the elimination of turns in the congested district by other vehicles. Regulations eliminating left-hand turns entirely at most of the important intersections within the Loop were consequently adopted and put into effect. This has improved the conditions to such an extent that the Surface Lines are now engaged in a further study of the resulting effect on street car movement, looking toward a revision of schedules that will take advantage of the reduction in congestion to effect a saving in time for the 75 per cent of Loop passengers who ride the street cars.

# The Readers' Forum

## *Say In Situ Treatment Is Used on 250 Miles of Track*

MESSRS. C. P. SANDBERG
*Consulting and Inspecting Engineers*
40, Grosvenor Gardens,
LONDON, S. W. 1

Nov. 3, 1924.

To the Editors:

The Foreign Report Number of the ELECTRIC RAILWAY JOURNAL of Sept. 20, 1924, contains the advance publication of the report of the American Electric Railway Association committee on foreign operation. The observations of the committee, as expressed in the summary and also in the main report in regard to the operation of British tramways, are both cogent and intimate, and form a valuable record of the opinions of the managements of the undertakings dealt with. The report is discriminating and, as is only to be expected in a document of this kind, prominence is given throughout to the special features which obtain on the several tramways visited. On the whole the committee is to be congratulated upon its presentation of the situation in each tramway district visited, and there can be no doubt that the information published will be quite as interesting to British tramwaymen as to their confrères in the U. S. A.

It is only to be expected that minor errors have not been avoided, and our attention has been called to the observations of the committee in regard to the Sandberg *in situ* rail hardening process. In the summary it is stated that the *in situ* treatment of rails is still in the experimental stage, and in the body of the report the article on *in situ* treatment of rails expresses the opinion that British "experience is not yet of sufficient amount to provide any definite opinion as to its merits . . . and the best that can be said for it up to date is that the results have been sufficiently good that some of the tramways are making further installations as a means of gathering further data." It would appear that these observations are based solely upon the limited amount of rail treated to date on the tramways within the London area which, owing to the destructive effect of the magnetic track brake, has been, as stated, on an experimental scale.

The Sandberg *in situ* rail hardening process has, however, long since passed the experimental stage. Since its introduction six years ago over 250 miles of track have been treated in Great Britain. The process is now being developed on the Continent and in the Dominions. A number of important British tramways have adopted the process as part of their regular maintenance operations, and it will be of interest to observe that the Leeds, Liverpool and Manchester Tramways have had 25, 30 and 46 miles of track treated respectively, and a number of other systems have each placed repeat orders for the treatment of upward of 10 miles of track.

The resistance of treated rails to wear is very much greater than that claimed in the committee's report, as is shown by the following calculation based upon the average results of 30 sets of gagings taken upon representative tramways in the United Kingdom, after

the passage of 2,400,000 tons (English) of traffic in each instance:

Average wear on untreated rails, 0.0398 in. per 2,400,000 tons (Eng.)
Average wear on *in situ* treated rails, 0.0173 in. per 2,400,000 tons (Eng.)
Average wear on untreated rails = 2.3 times that on *in situ* treated rails
With a $\frac{3}{16}$ (0.1875 in.) depth of *in situ* treatment at the above average wear (0.0173 in.), treated rail would last ..... 10.83 years
At the above average wear (0.0388 in.) $\frac{3}{16}$ in. untreated rail would last ..... 4.71 years

Severe tests were carried out by the London County Council Tramways over a period of about 3 years in order to ascertain the resistance to corrugation of rails treated by the Sandberg *in situ* process. During this period the test rails both treated and untreated were traversed by 2,092,000 cars (33,000 lb.) or approximately 31,000,000 tons (English), and corrugations were removed on three occasions from the untreated rails while the rails treated by the Sandberg *in situ* process remained free from corrugations throughout the test. Similar proof of the resistance to corrugation of the treated rails has been obtained from numerous other undertakings. It will be seen from this information that very definite advantages are being derived from the Sandberg *in situ* process and that it is now extensively established in Great Britain.

C. PETER SANDBERG.

## *Mitten Management Considers Changing Philadelphia Wage Basis*

PHILADELPHIA RAPID TRANSIT COMPANY

PHILADELPHIA, PA., Nov. 10, 1924.

To the Editors:

Your editorial in the Nov. 1 issue, regarding the method of determining street railway wages, is a heartening indication that the industry is awakening to the importance of its most vital problem. It occurred to me that you might be interested in having the viewpoint of Mitten Management on this subject.

Wages will never be properly adjusted in any industry so long as the primary object of the employer is to receive the utmost service which he can coax from the employee for the lowest possible wage; nor while the only aim of the employee is to receive the highest possible wage for the least possible work. There must be a just recognition on the part of each of the rights of the other, and a joint appreciation of the rights of the consumer, who pays both dividends and wages.

Mitten Management believes that it has found the solution of the wage problem, basing its belief on the fact that it is now rendering in both Philadelphia and Buffalo a strike-proof service, with a satisfied body of men who recognize that higher wages can only come through greater effort on their own part. This is accomplished by a plan with which you are no doubt familiar, under which the men are made partners with the management. The latest step in the plan as applied in Buffalo is contained in the inclosed Tulley Talks No. 21, which is issued today. (Published below.)

The wages of P.R.T. employees are based on the average of those prevailing in Detroit, Cleveland and Chicago. We have long recognized the inadequacy of this method of arriving at a base, because each of these cities determines its wages upon successive strike-threats and arbitration. We have now under careful consideration a plan to base the wage in Philadelphia on the purchasing power of the dollar, continuing our policy of giving the men full opportunity to secure, in higher wage, the benefit of their greater effectiveness, which is further encouraged by the investment of this added wage in the securities of their company, whose value and dividend-paying ability is thus practically underwritten by them.

J. M. SHAW,
Editor *Service Talks*.

### How I. R. C. Employees Can Best Lend Their Aid

(From "Tulley Talks" No. 21)

Mitten Management is deeply grateful for the offer of support from I.R.C. employees in meeting the financial burden of the recent Niagara Falls high-speed accident, but does not feel that such sacrifices will be necessary at this time. There is a way, however, by which I.R.C. employees can aid the management without calling upon funds which are necessary to meet the needs of their adequate living and saving.

I.R.C. employees are already partners with I.R.C. management, by virtue of the investment of part of their 1924 wages in I.R.C. bonds and stock. The wages of the men are now 57½ cents per hour, 2½ cents of which is paid into the co-operative wage fund administered by elected trustees and invested in the company. The full wage agreed upon for 1924 will be paid, and the management plans, with the continued co-operative effort of I.R.C. employees, to make possible a further increase in the basic wage rate.

Mitten Management now suggests that the basic wage rate for 1925 be continued at 57½ cents per hour, and that 2½ cents of this amount be used, as now, for the purchase of I.R.C. securities by the trustees of the wage fund, and further that after I.R.C. earns and pays the 5 per cent interest on its I.R.C. bonds, an additional wage of 3 cents per hour be then added; the full amount of this added wage—a total wage of 60½ cents per hour—to be paid during 1925, or as soon thereafter as the company's financial condition makes such payment possible.

What is done with this added wage will of course lie entirely with the employees, but the management strongly recommends that it be placed in the co-operative wage fund, and that it be invested in I.R.C. bonds and stock, in furtherance of the policy of employee-ownership which has so far helped keep International on an even keel, and will, we are confident, eventually put I.R.C. upon a safe and dividend-paying basis.

This proposal is to be now placed before the general committees, and if approved by them will be submitted for the signed approval of all employees. By accepting this proposal and thus underwriting the payment of the interest on I.R.C. bonds, and by directing their trustees to invest in I.R.C. bonds and stock the 10 per cent added wage over the 55-cent rate now being paid, I.R.C. employees can best lend their aid, and bring themselves into still closer partnership with the management.

## *A Suggestion About Whistles*

THE OHIO BRASS COMPANY

MANSFIELD, OHIO, Oct. 31, 1924.

To the Editors:

We have received a letter from one of our customers (J. C. Schade, manager railways Wisconsin Public Service Corporation, Green Bay, Wis.), asking if we can furnish some kind of a chime whistle to replace the shrill whistles now on their line.

This incident suggests a thought that you might feel worth passing on to the industry. Place in the car a blank on which passengers are requested to write any criticisms that they may have on the service, stating what if anything connected with the ride is annoying, uncomfortable or distasteful. I know from personal experience that one interurban company has its cars equipped with whistles that will give one a headache within a 30-mile ride. There are other discomforts on many lines that could be eliminated and would be, if the management knew how they unconsciously move the patron to avoid riding on the traction lines.

JAMES H. DREW,
Manager Line Material Division.

# Equipment Maintenance Notes

## Shop Testing of Circuit Breakers

BY F. C. LYNCH
Shop Supervisor Kansas City Railways

IT IS the practice of the Kansas City Railways to set car circuit breakers at 150 per cent of the full load rating of the motors. In the past it has been found that unless these settings are carefully checked in the shop, there is a tendency on the part of operating forces to screw the settings up so high that the breaker does not operate even on severe overloads. This condition causes very high maintenance on electrical equipment.

A general mechanical department order issued to all maintenance departments shows the correct setting for each type of equipment in service. The divisions are not permitted to change the settings of breakers in service, but are instructed to return those thought to be incorrectly set to the shops, where all adjustments are made.

To do this work accurately in the shop, the test panel shown in the accompanying illustration has been provided. In addition to the panel itself, containing the various instruments required to check the setting at which the breakers open, a special type of mounting frame is provided for supporting the breakers in a position corresponding to their mounting on the various types of cars.



It Is the Practice of the Kansas City Railways to Make All Circuit Breaker Adjustments in the Shop. The Mounting Rack Shown Is Arranged so that the Breaker on Test Can Be Supported in Either a Vertical or Horizontal Position, Corresponding to the Position in Which It Is Mounted on the Car

The mounting frame is shown in the center of the illustration, with a circuit breaker in position for testing. It will be noted that vertical and horizontal straps contain long slots, so as to allow different types of breakers to be mounted readily. In addition to this, the board on which these straps are carried is hinged at the bottom and held by a catch at the top, so that the breaker can be supported for testing, in either a vertical or horizontal position.

The settings used for breakers on the various types of electrical equipment in service in Kansas City are shown in the accompanying general maintenance order issued by the mechanical department to cover this detail of practice.

KANSAS CITY RAILWAYS COMPANY
MECHANICAL DEPARTMENT

**Subject:** *Circuit Breaker Setting*

**General Order No. 77**

All circuit breakers will be adjusted and set at the shops, and will be pinned so that the setting cannot be changed.
The settings will be as follows:

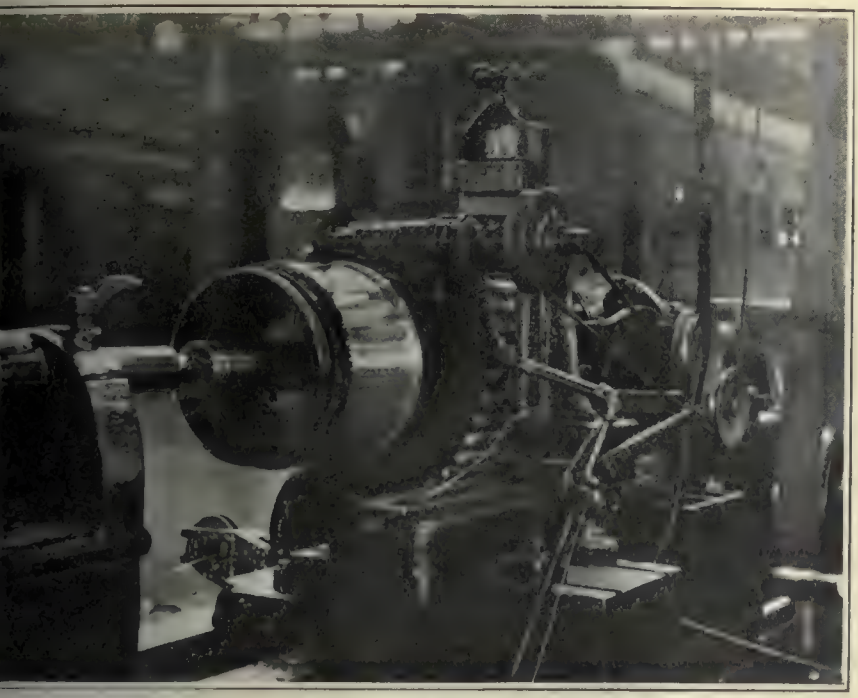
| Type of Motor | Number of Motors | Circuit Breaker Setting | Full Load Current | Per Cent of Full Load Current |
|---|---|---|---|---|
| GE—57 | 4 | 550 Amp. | 92 Amp. | 150 |
| GE—67 | 4 | 425 Amp. | 72 Amp. | 147 |
| GE—67 | 2 | 210 Amp. | 72 Amp. | 145 |
| GE—70 | 4 | 425 Amp. | 70 Amp. | 150 |
| GE—80 | 4 | 425 Amp. | 71 Amp. | 150 |
| GE—202 | 4 | 425 Amp. | 74 Amp. | 145 |
| GE—247 | 4 | 315 Amp. | 52 Amp. | 151 |
| GE—258 | 2 | 150 Amp. | 37 Amp. | 200 |
| WH—306 | 4 | 550 Amp. | 88 Amp. | 155 |
| WH—508 | 2 | 150 Amp. | 37 Amp. | 200 |

The Divisions will not attempt to change these settings. Any breakers that are found improperly set will be returned to the Shops.

This General Order Shows Correct Setting of Circuit Breakers on Each Type of Car Equipment Used in Kansas City

## Commutator Slotter on Banding Lathe

IN THE Decatur shops of the Illinois Traction System a home-made commutator slotting attachment has been rigged up on a modified engine lathe. The attachment consists of a vertical standard mounted on the former tool post guide at the rear of the lathe bed. This upright slides longitudinally parallel to the axis of the lathe and carries at its upper end the milling spindle, which can be raised or lowered by means of a hand screw on top of the upright. The spindle carries a small milling cutter at one end and a 5-in. grooved pulley at the other. Two idler pulleys mounted beneath and to one side guide the raw-hide driving belt which takes power from the overhead line shaft. This arrangement permits the apparatus to be moved back and forth. Compressed air from the shop supply is used to blow



Home-Made Commutator Slotter Also Serves as a Banding Machine in the Decatur Shops of the Illinois Traction System

ne particles of mica and copper way from the cutter, being fed rough a rubber hose, with a regu- ting valve for the operator.

In operation, the milling cutter is ned up with the axis of the arma- ure, which is then revolved until ne mica is in line with the cutter. fter moving the vertical screw djustment to get the necessary epth of slot, the cut is made by iding the tool back and forth on ne ways of the tool post guide.

The entire outfit was made in the ops from materials at hand. The ree pulleys are brass trolley wheels nd the upright with screw adjust- ent is a portion of an old lathe, hile the spindle shaft and housing ere made up in the machine shop. This lathe is also used when band- g armatures, so that preparation f the rewound armature for service all done on one machine.

## Wheel Grinding Practice in Twin Cities

FOR a number of years the Twin City Rapid Transit Company's echanical department has been rinding the treads of rolled-steel heels, using a Norton grinder for ne purpose.

This practice is followed in all ases where wheels require atten- on, except when a thin flange de- elops to a point where the wheel ust be turned. In this event the ntire tread, as well as the flange, turned.

One interesting feature in connection with this grinding is the practice of cutting a groove in the throat of the wheel where the flange joins the tread. This is done to prevent the corner of the grinding wheel from chipping when it comes in contact with the fillet at this point.

Speed in handling wheels to and from the machine is an important element in obtaining maximum output per day. In the Snelling Avenue shops an overhead electric hoist, traveling on a track at right-angles to the machine, has enabled one man to handle wheels and operate the machine. With these facilities, one man grinds an average of between 30 and 35 pairs of wheels per working day.

A liberal flow of plain water is used to cool the grinders. This is fed by means of a centrifugal pump delivering the water from a tank under the machine. After passing over the grinding wheels, the water drains back into the tanks and is recirculated.



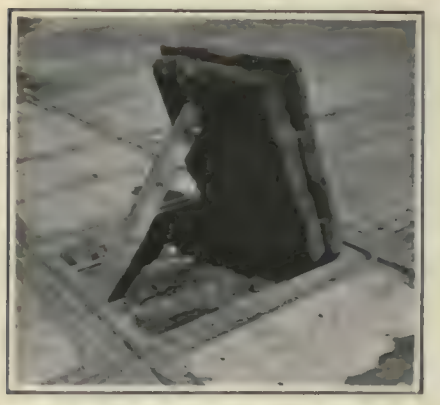
One Man Grinds 30 to 35 Pairs of Wheels per Day on This Norton Grinder in the Twin City Rapid Transit Company's Shop

## Wood for Crossing Pavement

AT THE heaviest crossing in Fort Wayne, the double-track Calhoun Street line of of the Indiana Service Corporation crosses the three-track route of the Nickel Plate Railroad. As Calhoun Street is the main street of the town is was necessary for the street railway to provide a suitable pavement between the rails and between the tracks of its line. It was imperative that this pavement be of such construction that it could easily and quickly be removed and replaced when repairs to the crossing became necessary.

The type of pavement used is made up in sections which fit between the rails of the crossing. These sections are constructed of 3-in. planking laid in two layers, one layer being laid at right angles to the other, and the two are fastened together by means of ⅝-in. bolts with washers. The lower layer is roughly cut away to fit around the irregularities and bolt heads of the crossing. The top layer is nicely fitted to the head of the guard rail.

In the center of each section is



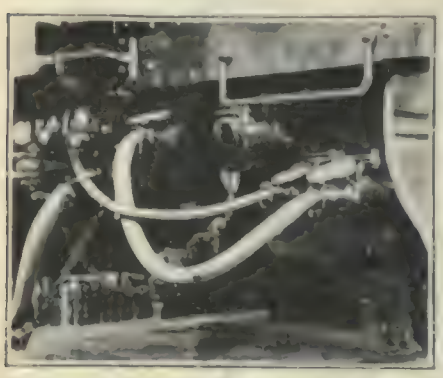
Section Raised, Showing How Lower Layer Is Hewn to Fit Bolt Heads, While Upper Layer Is Cut to Fit Head of Guard Rail

a 3-in. diameter iron ring securely fastened through the double thickness of planking with an eye-bolt. It is possible to remove the section a small derrick or by hand.

This type of crossing pavement is economical to construct and has met with the approval of the authorities of the city.

## Permanent Jumpers Reduce Maintenance

THE New York, Westchester & Boston Railway uses two jumpers between cars of each train. Both are for 32-volt circuits, a 12-point train-line jumper being used for the control equipment while a 5-point jumper is used for control of the electric brakes. The company is now fastening these jumpers permanently in position in one pair of receptacles and is providing dummy receptacles for holding the loose ends. The dummy receptacles consist of the standard casing without contacts and they are being mounted on the end step support as shown in the accompanying illustration. The maintenance forces report that troubles and the maintenance of the jumpers have been reduced more than 90 per cent since this change has been undertaken.



Permanent Jumpers Used on the Cars of the New York, Westchester & Boston Railway

# *Dick Prescott Discusses Plans*

## And Prepares for the Trip with Steve



TO DICK'S delight, Steve White, the carpenter shop foreman, was selected to accompany him on the trip of inspection to gather ideas before starting in on his new work of organizing an engineering department in the shops of the Consolidated Railway & Light Company. Steve himself brought this additional good news when he returned from the office of Thomas Mullaney, general foreman.

Thus these two men, although young in comparison with some of the other men in the shop, were selected to initiate the new program of improvements. In recognizing the ambition, vision and initiative of Dick and Steve, by this selection Mullaney proved himself a capable executive despite his many years of obstinate devotion at the shrine of precedent.

"Well, Dick," said Steve, after their first burst of rejoicing had subsided, and they found themselves seated in the little carpenter shop office discussing their plans for the trip, "we're going to have a pretty stiff job getting an engineering department under way, and most of it will be up to you. From what I gather, the old man wants me to kind of follow along and give you what advice I can from the practical standpoint, and I'll give you all the help I can—you know that.

"But, as you must appreciate, the real work of organizing this new department and getting it working in harmony with the rest of the shop will be your job. That's not going to be easy, for although the old man has made up his mind that something's got to be done, you'll have to sell him your ideas every step of the way and it'll require lots of patience and courage."

"I think you're right, Steve, and I'm certainly glad to have your experience and knowledge of the shop conditions to help me over the rough places. I want to start things slowly and to demonstrate by actual performance the service an engineering department can render. Once Mr. Mullaney and the foremen are convinced that we can save them a lot of lost motion and be a real help in getting out their work, it will be easy sledding. I intend to feel my way along at first and study conditions carefully, rather than try to make a big showing at the start."

"That's the idea, Dick, and you can depend on me to help you all I can. I see where you can help my department a lot and I know the same conditions apply in other departments. When we get back from this trip I'll try to tell the advantages of the new plan to the other foremen so as to get them interested in giving you their co-operation."

"I'll certainly appreciate your help very much. There are several things that we can get started on as soon as we return. For instance, it seems to me that the shop badly needs some way to standardize maintenance practice. Maybe we can issue a uniform kind of maintenance order giving the exact practice to be followed. Such items as limits of wear for bearings, oiling periods, procedure on inspection and many other details like that could be definitely covered by such orders. That would cut out the guesswork and ought to improve our methods. My idea would be to have these standards we propose freely discussed at foremen's meetings, so that each order would actually represent the combined opinions of the department staff rather than the idea of a single individual."

"Good dope, Dick, you're thinking along the right lines. That's an instance of some of the things we can get under way when we get back. Now we ought to start out and make up an itinerary for this trip. The old man says we can have three weeks, and we want to make the most of the time. Suppose we start in and make a list of the properties we want to visit and note some of the things we want to see in each shop."

## Sheet Metal Roll Smooths Armature Laminations

WHEN armature cores require rebuilding in the Snelling Avenue shops of the Twin City Rapid Transit Company, a sheet metal pressure roll, manufactured by the E. W. Bliss Company of New York, is used for reclaiming bent laminations.

This pressure-rolling machine is power driven and is found to be very effective in smoothing out the laminations. Previous to the installation of the above machine this work was done by hand. The machine method now cuts the total cost of armature rebuilding by 50 per cent in comparison with the former hand operation. In addition, the laminations are smoothed out in much better condition than was possible by hand methods, and it is found to be much easier to get them back in place on the shaft. The sheets stack up evenly so that pressing the core together after assembling is made less difficult, and a better armature is obtained.

## New Type Heavy-Duty Dolly Truck

FOR transporting heavy materials, particularly steel sections such as girders, angles or plates, a heavy-duty truck has been built in the Wheaton shops of the Chicago, Aurora & Elgin Railroad. This truck is of wood frame construction, braced and reinforced by steel bars. The frame consists of two 2-in. x 4-in. members approximately 4½ ft. long joined near the ends and at the center by means of three cross-sills of the same cross-section, but only 18 in. long. Below the center cross-sill is a wood bolster made up of 3-in. oak of sufficient width to allow the wheels to have clearance over the side sills.



Heavy-Duty Truck Used for Transporting Steel from the Storage Yard to the Blacksmith Shop

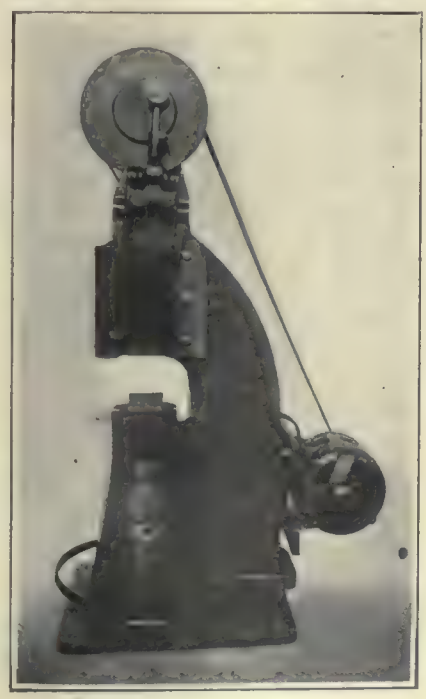
The wheels are of solid oak construction 2 in. thick and of 18-in. diameter with ¼-in. steel tires. The upper frame is braced to the axle on each side by means of two 1½-in. x ¼-in. steel bars. The framework is held together by means of long through bolts, and the upper surface is covered with 2-in. x ¼-in. steel. The side sills of the frame project beyond the end sills approximately 5 in. and are tapered and shaped in the form of handles. The axle consists of 1-in. steel shafting to which the wheels are held by means of washers and cotter keys on the outside end.

The truck is so well built that it is possible for one man to move ½ ton of steel over the concrete walk from the storage yard to the blacksmith shop. The entire truck was built in the blacksmith and carpenter shops, there being no machine work in conjunction with its construction.

# New Equipment Available

## Small-Sized Power Hammer for General Service

GENERAL service hammers designed particularly for shops where there is insufficient blacksmithing to warrant a large investment in a power hammer are being placed on the market by Beaudry Company, Inc., Everett, Mass. These



Motor-Driven Hammer for General Service

hammers are built in three sizes with rams weighing respectively 25, 50 and 100 lb., and they may be operated by an overhead belt or can be equipped with individual motor drive.

The hammer is started, stopped and regulated through the treadle which throws a cone clutch in or out of the hammer pulley. The hammer head is of steel. Its travel is guided by external elliptical-shaped tracks. Two steel spring arms with steel rollers at the lower extremities and a helical spring at the top operate upon the curved track and lift and throw the ram, which with increased speed of hammer acquires increased travel and force of blow. Full strokes can be obtained on varying thicknesses of stock with no change of adjustment.

The ram operates in heavy V-shaped guides and has in addition an adjustable taper gib for taking up the wear. The hammers have long strokes and may be operated at high speed. Since the frame is self-contained and cast in one piece no extensive foundation is needed, and in some cases the hammers are bolted directly to the floor. These hammers may be worked to equal advantage from all sides, and as the anvil is offset long bars may be worked either way of the dies.

## Connector for Temporary Work

A NEW line connector suitable for use where occasional disconnection is required and where particularly quick disconnecting is not necessary has been placed on the market by the General Electric Company, Schenectady, N. Y. It is recommended particularly for making temporary connections in construction work.

The clamp is of brass with the exception of the spring, which is of phosphor bronze, and the two set screws, which are of zinc-plated steel. A standard disconnecting switch hook is used to operate the

device, which is so designed that the hook is held firmly to the connector while this is being attached or removed from a line. The connector has a current carrying capacity of 200 amp. and can be clamped to wires of diameters from ⅛ in. to ⅜ in. A ⅛-in. hole is provided for soldering a lead to the connector.

## Waste Metal Crusher

A NEW electrically driven machine, known as the American chip crusher, that reduces the volume of long, loose, bushy metal turnings has been placed upon the



This Crusher Reduces Metal Turnings to ⅛ or Less in Bulk

market by the American Crusher & Machinery Corporation of New York City. It is a low-speed machine for cutting, grinding and crushing metal turnings and similar scrap into coarse, granular pieces which can be handled with shovels, magnets, belts or conveyors.

The machine is simple, the only parts subject to wear, the cutters or knives, being removable and easily replaced. The metal turnings are forked into a hopper and the cutting action is accomplished by a number of spiral knives made of specially treated steel.

A Westinghouse 4-hp. motor drives the unit. The control apparatus is all built in. To prevent the accidental entrance of solid metal pieces too large to pass through the crusher, it is equipped with devices that protect it against the breakage of knives and the strains of overloading.

The economy of storage space, the saving in handling and shipping, and the increase in salvage value of waste metal turnings, made possible by this machine, have made it popular in machine shops and with waste metal dealers. The unit illustrated has a capacity of 5 tons of ordinary turnings per day.

## Vertical-Horizontal Hydraulic Press

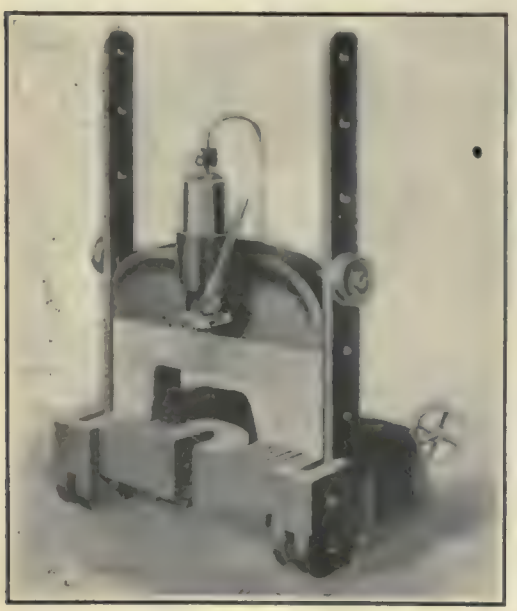
TO MEET a demand for a general utility shop press, the Watson-Stillman Company, New York, N. Y., has combined in one unit a vertical or a horizontal press for all operations which are ordinarily done in electric railway shops.

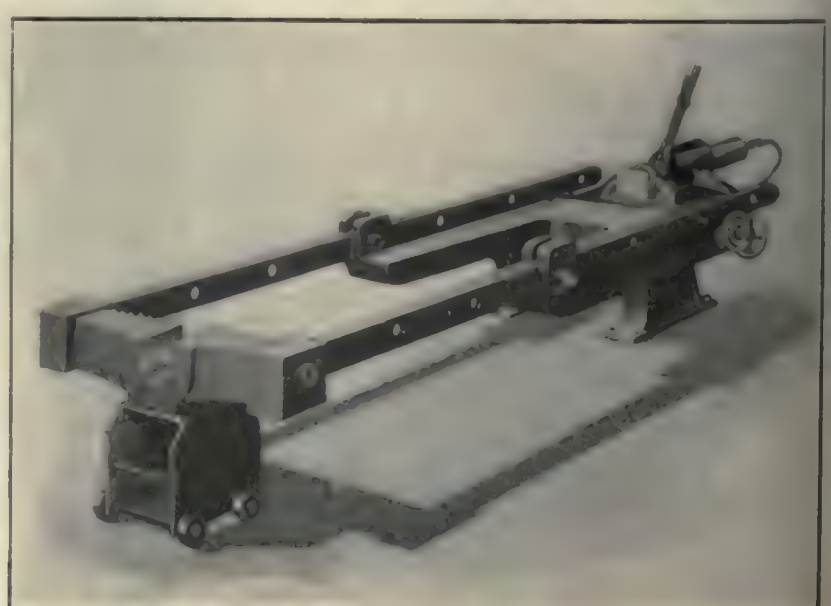
The machine may be converted from the vertical to the horizontal press by rotating the yoke by means of a hand wheel as shown in the illustration. The press is so balanced that the change from vertical to horizontal position may be made without the assistance of cranes or jacks. In the horizontal position it may be used for a variety of purposes, such as bending structural shapes, bars, pipes, etc., for forcing fittings, pressing gears on and off, forcing bearings into and out of housings, and like work. The bed of the press is planed smooth and the forcing tool on the end of the ram is supported on this bed.

For forcing long shafts, the abutment beam may be moved out a maximum of 7 ft. A four-wheel truck is provided to permit easy handling and also to support the beam when in the extended position. Hydraulic pressure is used only for the high pressure stroke of the ram. The idle portion of the forward stroke and the return movement is effected by a pinion which meshes with a rack in the ram. This rack and pinion device is of sufficient power to permit the use of this press for light arbor work without hydraulic power. The press is usually furnished with a hand pump, complete with hydraulic gage, pipe and connections. It may also be operated by a small two-plunger power pump. The press has a capacity of 60 tons and weighs 3,700 lb.

## Apex $CO_2$ Recorder

AN ENTIRELY new and inexpensive $CO_2$ recorder known as the "Apex" has been introduced by the Uehling Instrument Company, Paterson, N. J. Inasmuch as the price of the new recorder is less than half that of other $CO_2$ machines, including the standard Uehling, it is believed that the new instrument will open up an entirely new field among the smaller plants, as it is stated that the anticipated fuel savings will warrant its adoption for boilers of 50 hp.





At Left, Press in Vertical Position. At Right, Same Press in Extended Horizontal Position

or over. The pyro-porus filter and the standard Uehling gas drier and desulphurizer are used, insuring cleanliness of the gas line and interior parts of the instrument. There are no chemical solutions and no moving parts excepting the pen mechanism. As a result the manufacturer claims that the recorder will operate accurately without any attention or adjustment other than the changing of charts and renewals of dry absorbent, which should not exceed 10 minutes weekly.

This new type of recording instrument will be exhibited for the first time, in both recording and indicating types, at the Power Show which will be held at the Grand Central Palace in New York during the first week in December.

## Automatic Circuit Breaker Can Operate Manually

THE Automatic Reclosing Circuit Breaker Company, Columbus, Ohio, has recently developed a circuit breaker which normally is full-automatic in its operation, but it may at any time be operated in the same manner as a manually operated circuit breaker by depressing the operating handle.

When operating as an automatic reclosing circuit breaker it is under the control of a double pole push-button switch. When this switch is in the "off" position all of the control circuits of the breaker are completely disconnected and the breaker remains open. When the switch is in the "on" position the control circuits of the breaker are connected and the breaker closes, provided conditions on the line are proper for it to close. On overload, it opens automatically, remains open a short time interval, regardless of load conditions, and at the expiration of that time interval recloses, providing the overload or short circuit which caused it to open has been removed.

When for any reason whatever it is desired to operate the circuit breaker manually, the control switch is thrown in the "off" position and the operating handle attached to the breaker. The breaker is then closed in the usual manner by depressing the operating handle. It will open on overload or voltage failure if provided with no-voltage release. The operating handle is removed when the breaker is again placed in automatic operation. Breakers of this type are available in capacities up to and including 2,000 amp.

## Improved Rivet Heater

SEVERAL improvements have been made in the electric rivet machines manufactured by the Humil Corporation, New York City. The accompanying illustration shows one of the latest types as used at the Harmon shops of the New York Central Railroad. Rivets are heated by their resistance to electric current, so the heat is generated in the rivets themselves. The machine is of rugged construction and is built entirely of metal, asbestos and mica, so as to be fireproof. All coils are impregnated with high grade insulating varnish, to make them waterproof.

Particular attention has been given to provide safety for the operator. All live primary parts are shielded and the voltage at the heads of rivets is so low that it can hardly be felt, this voltage never exceeding 3 volts. Transformers are furnished for any primary voltage available, such as the a.c. lighting circuit. Recent improvements include a redesigned control mechanism which is of the interlocking type. This is so arranged that the main stop and start switch, which is shown in the lower left of the illustration, locks the controller against movement when load is on the machine. This prevents all arcing and burning of control contacts. The stop and start switch is also locked out until the controller brush is in the proper contact position. The control contacts are made of heavy plate copper, the movable one being of the laminated brush type. The current applied to the rivets is regulated by a five-speed controller which gives five different current values and so enables the operator to govern his production rate accurately. Rivets are removed and inserted by pressing the pedal for the contacts desired.



Improved Rivet Heater in the Shops of the New York Central Railroad

All of the coils are located around a separate center core. The secondary coils of heavy cast copper inclose the core completely except for a small gap at the top to provide the open circuit necessary. This design provides for the complete cutting of all magnetic lines by both primary and secondary coils. The primary coils are wound with bare strip copper insulated with asbestos and mica tape. This provides rapid dissipation of the heat to the vertical air spaces and at the same time eliminates high voltage between layers of windings.



Rivets Are Heated Uniformly in the Electric Machine

The small illustration shows the heat developed in rivets and that the rivets are heated evenly all over. This insures faster, tighter and cleaner riveting with less chance of loose rivets.

## High Strength Cable

A NEW type of messenger or feeder cable for use in connection with railway electrification has been developed by the Bridgeport Brass Company, Bridgeport, Conn. It is intended for use in sustaining the contact wire through which current is carried to the electric rolling stock and at the same time to transmit the current from the power house. For this purpose it is necessary that the cable possess high electrical conductivity, great tensile strength, and non-corrodibility.

The cable is composed of an inner core consisting of seven strands of Phono - Hi - Strength wire, 0.11 in. diameter, and having a tensile strength of 130,000 lb. per square inch. This inner core is surrounded by 12 strands of hard-drawn copper, each 0.11 in. diameter.

# Association News & Discussions

## Regulators Must Avoid Competition*

### Essential Railways Must Be Protected from Inroads of a Competitor Not Capable of Replacing Them by Regulation that Will Develop the Bus Along Sound Lines to Its Own Best Interest and to the Public's

BY J. N. SHANNAHAN
President American Electric Railway Association

I HAVE journeyed the 2,000 miles that separate Phoenix from my home upon Chesapeake Bay, in Virginia, because I believe it is of paramount importance that whatever can be done should be done to make clear the story of the electric railway to you gentlemen, who in your official capacity have so great an influence upon the fortunes of our industry.

It is no decadent, no obsolete, no dying industry. On the contrary, its preservation and its progression are as vital to the interests of the people of the United States as they have ever been, and there is as I see it no sign anywhere that the service performed by it will grow less essential in the years to come.

In 1922 the United States Bureau of the Census reports more than 15,300,000,000 passengers were carried on the electric railways of this country. This represents a gain in 5 years of more than 825,000,000 passengers, or nearly 165,000,000 a year. And it must be remembered that these 5 years saw the restriction of imigration, the migration of millions of our young men to the battlefields of France, the manufacture in this country of more than 8,000,000 automobiles and the intensive development of the motor bus as a common carrier.

Certainly, if statistics are needed to demonstrate the essentiality of electric railway service, this record of increased traffic, under conditions admittedly unfavorable to traffic growth, offer convincing proof that the electric railway industry is advancing and not falling back.

I make to you, therefore, no plea for the mollycoddling of a passing system of local transportation, the usefulness of which is gone, and the dying agonies of which you are asked to alleviate. On the contrary, I seek your co-operation in continuing, under conditions fair alike to the public which uses it and to the companies which furnish it, a service essential to the welfare of every community of any size in this country.

#### SERVICE OF THE BUS SHOULD BE CO-ORDINATED WITH PRESENT SYSTEMS

Recently a new factor has appeared in the transportation problem. Without going into detail as to the merits of the motor vehicle as against the street car, it must be admitted that it has its place and its function. Certain territory in many localities can be best served by it. It is a flexible means of transportation. Many people like it. During the next few years thousands of motor vehicle routes will be laid out and franchises applied for. Instead of a deadly competition, should there not be a co-ordination of the present agency, the street car, and the motor vehicle? Instead of a situation where the street railway lines and the motor vehicle lines are straining every muscle to drive each other out of the field, why should they not blend together in order to perfect a transportation system to meet every need of the community which they desire to serve? In order that this co-ordination, this blending, this union, may be brought about several things are necessary:

First—There must be legislation which will set the motor vehicle in its proper place, on its own account and in relation to other means of transportation, as a common carrier, and on a footing with street car transportation in so far as franchises, penalties and restrictions are concerned.

Second — There must be legislation which gives the preference to the agency already serving the community to make needed extensions, whether they take the form of street railway or motor vehicle extensions.

Third—The regulation of such motor vehicle lines, whether urban, suburban or interurban, should be under the supervision of the public utility commissions of the various states, and certificates of convenience and necessity should in all cases be required.

Fourth—Where such extensions are necessary, and are demanded or requested, it should be within the power of the commission to designate what form these extensions should take.

Fifth—This legislation should be uniform, if possible, in all the states, particularly on account of the rapidly growing interstate business.

The electric railway managements of the country realize fully, I think, the advantages and the possibilities of the motor bus. According to the last available figures, 155 companies in the United States are operating 2,000 of them, and the number of companies and the number of buses are growing constantly. From the experience gained as operators, as well as from careful study and investigation, has come a conclusion, which is also borne out by the experience in Great Britain and other European countries where buses have been used in connection with electric railways for a much longer period than upon this side of the ocean. That conclusion is this:

In the handling of mass transportation, i.e., the carriage of great numbers of people within short periods of time; concretely, the carriage in our industrial centers of more than 40 per cent of all traffic in 2 hours of the early morning and 2 hours of the late afternoon, the electric car is the most efficient and most economical vehicle that can be used.

I think that this is an understatement of the situation, and that as applied to our larger communities it may with truth be said, that laying aside efficiency and economy, the electric car is the only vehicle that can perform the task at all. I reach this conclusion because the streets of few, if any, cities have sufficient area to accommodate the immense fleet of buses that would be required.

In cities that have subway or elevated systems for the operation of trains the field of the motor bus widens. It is conceivable that if such systems be extensive enough, the surface street railways may within a reasonable radius of such lines be superseded by buses, providing always that the operation of the two facilities be properly co-ordinated. But outside of New York, Boston, Chicago and Philadelphia there are no such subway or elevated systems, and so, to borrow the expression used in a famous opinion of the Public Service Commission of the Second District of New York, the street railway is the "backbone of any transportation system" in practically all of our large cities.

#### COMPETITION CANNOT BE TOLERATED

The motor bus is, however, an efficient auxiliary to the electric railway and within its field should be given every possible encouragement. But I need not tell you gentlemen, who are the agents to whom the task of carrying out the great policy of regulated monopoly among public utilities, that competition between the electric railways and motor buses is as destructive of public welfare as is competition between telephone utilities, gas utilities or electric utilities; or that to injure, through competition, the ability of a common carrier to perform service is to work a wrong to the people who receive that service.

Competition upon any fair or equitable basis between electric railways

*Abstract of address before National Association of Railway and Utilities Commissioners at Phoenix, Ariz., Nov. 14, 1924.

and motor buses is impossible. The motor bus owes its existence as a carrier to a public subsidy, in the shape of a right-of-way, built and paid for by the taxpayers generally, and not included in the cost of service upon which its rates are based. Without good pavements motor bus operation would be impossible. Charge to the motor bus its share of the construction and maintenance of pavement and motor bus fares would be prohibitive.

I do not argue for the imposition of additional burdens of taxation upon the bus. I do not quarrel with the policy of providing proper highways out of public funds for use by common carriers. I do, however, submit that it is the part of folly to destroy or cripple an existing necessary transit agency which pays a large portion of its income into the public treasury, by encouraging the competition of a publicly subsidized carrier, which, if it should be finally successful in eliminating its competitor, would itself surely fail under the burden of furnishing complete service.

It is but a short time ago that the proposition to put the motor vehicle under the control and regulation of the public service commission seemed rather startling. Yet slowly, but none the less surely, the idea has gained ground that the principal thing to seek and find is the public good. A system which permits a reliable medium of service to be harassed and annoyed by multitudes of parasites constantly nibbling at its patronage and its sources of revenue can hardly be said to be conducive to the public good.

Experience warrants the statement that in the average community the transportation service should be permitted by authority to take the form of a properly regulated monopoly. In many activities competition is the life of trade, but it requires no particular discernment to set it down as a fact that in the urban, suburban and interurban transportation business competition is fatal to prosperity and efficient service.

### Railway Should Be Given First Opportunity to Supply Bus Service

In the average community the transportation system is very often the result of a consolidation of several lines, perhaps built at various times. The corporation owning these lines has expended large sums in bringing them to a state of efficiency; its stock has been distributed among the people of the community, and if the corporation has been properly managed a good will has been built up in the community which is worth much to the utility in its dealings with the public. It may be that for many years it has handled the transportation situation in its locality with satisfaction to its public. Such a corporation should have the first demand upon the consideration of the people of that community whenever new lines of transportation are needed, and such a community, where the existing agencies have given satisfaction, should extend first to such agencies the preference in new territory and in new franchises.

Commission regulation as a substitute for competition has worked well in the case of railroads, of electric utilities, gas utilities and, where it is still effective, in the case of local transportation utilities. I know of no movement anywhere toward a return to the old system, whereby franchises could be indiscriminately secured without sanction of a central regulatory body, only to be sold, with or without physical property to the existing utility, to increase capitalization and bring a consequent effect upon rates. But the advent of the motor bus as a common carrier has injected an element of competition into the local transportation problem, that is being controlled and regulated all too slowly for the good of the public and of the utilities. Railway men, as well as public officers, have been slow to grasp the real meaning of the movement, and have been belated in recognizing that the situation at the root of it requires the same treatment that has been successfully applied in the regulation of other classes of public utilities.

The situation is clearing up. The studies made by this organization and the principles set forth in the decisions of many of the commissions here represented are having their effect upon the public mind. We are, I hope and trust, returning to the sane and sound policy of regulation that has been successfully applied in the past, and by so doing we are going to preserve the useful service of the electric railway, and add to it the equally useful service of the motor bus.

The propositions that I have set forth in connection with motor bus operation contain nothing that is not generally applied by your commissions in connection with the regulation of other utilities; they confer no special privilege upon electric railways; nor do they impose upon motor buses any regulation that is not now imposed upon electric railways in their relations to each other. They encourage the extension of motor bus service, they conserve electric railway service and they provide a means of bringing together both services, so as to organize a complete car and bus service to meet public requirements.

In considering the motor bus problem we are not confined to city lines, or even to state lines. Interstate bus lines have become a reality, and a stern reality, to state agencies which attempt to deal with them. As long as a traffic system remains within the boundaries of a single state, it is a state problem and may be handled and dealt with as such. However, when a state line is crossed it becomes more serious and more unmanageable. State commissions can no longer lay down rules, and unless the Interstate Commerce Commission has power to deal with the situation, where does such power lie? If it does not have it, should it not possess it? It seems to me that just as the commissions in the various states must see to it that proper state legislation is enacted, so equally important and necessary is it that these agencies should inaugurate the movement to give adequate authority to the proper body to deal with a situation that may soon become serious.

I but voice the general sentiment of electric railway managements when I say that we look to the state regulatory commissions represented in this association for such public spirited and intelligent action as will solve correctly and expeditiously the problems that the competition of the motor bus has brought about. We feel sure that you recognize, as we recognize, the essentiality of electric railway service, the advantages of motor bus service, the destructive effect of competition between the two and the beneficial effect of co-ordination under proper regulation by commissions having state-wide jurisdiction.

Such legislation can find its way to the statute books more easily through the efforts, the initiative, the recommendation and the active support of the commissions themselves than in any other way. It will not be denied that the real function of a public utility commission is to see that the public receives satisfactory service and the utility a satisfactory return on its investment. In order to accomplish this there must be no duplication of service. Each territory should be served by the agency best adapted to its needs, whether it be street railway or motor vehicle, and these results can be best brought about by the preference suggested above in giving the utility which is prepared to render the proper service the first opportunity to serve.

The present attitude of the average public service commission toward the development and regulation of the various utilities has been the result of a growth. The whole body of the law has changed within a decade. The attitude of the public has changed. The idea of the man in the street that commissions were created solely to protect the people against the greed of corporations has been reformed, and if such man is keeping up with the times and has caught the modern spirit of fairness and service, he believes that the commission has other duties of a different nature altogether, viz.:

(a) Seeing that both the public and the utility get a square deal in matters of rates and regulations.

(b) Giving the public service, but insisting that it pay what such service is worth.

(c) Removing the utilities as far as possible from the uncertain and unsavory field of municipal politics, and placing them where the rule of reason and common sense regulates them rather than the whim of ward politicians and small-town regulators.

For the association of which I am president, I offer you full co-operation and assure you that its members realize the difficulties in your path and the splendid service that you render to the public, first, and the utilities, second.

# Self-Ventilated Motors in Central Europe*

BY E. NIER
Manager of the Municipal Street Railways of Dresden, Germany

THE lighter street car service of earlier years kept back the wide adoption of self-ventilated motors, although Dresden, for instance, had 26 such motors in use as early as 1914. In these more strenuous days, every means of economizing power and cutting down upkeep must be exploited, so that there has been good reason to make greater use of the self-ventilated motor.

Out of 22 of the larger properties from which replies to a questionnaire were received, 10 reported no such motors at all. The remaining 12 did practically nothing in the war years, but in the year 1921 Berlin added 194 to a preceding 6 and now has 270; Dresden added 90 to the original 26 and now has 178; Hamburg began with 2 in 1922 and now has 108. Amsterdam has only 10, The Hague 74 and Vienna 72. The total number reported early in 1924 on the twelve properties was 860.

The fears that self-ventilated motors would suffer from the entrance of foreign substances, thus increasing their shopping time and upkeep, have not materialized in practice. Frequent sprinkling of the trackway is one method of minimizing the entrance of dust and other particles. Screens and filters cannot keep out dust entirely, but it is gratifying that the material picked up has not proved very harmful.

The Hagen Street Railway operated over such a dusty roadway that it arranged to take the air from the car interior through hose of 60 mm. (2.4 in.) to 100 mm. (4 in.) diameter. This hose did not last long because of the constricted space between car body and truck. Hence 54 motors were closed to operate in the ordinary way, but 32 were still run as self-ventilated motors. Vienna has also tried to use air from within the car. The Merseburg interurban railway has taken air from the roof through a pipe run through the partition between the second and third-class compartments.

A typical case of dust collection showed much dust blown out of a perfectly sound self-ventilated motor which had come into the shops after a run of 35,000 km. (21,700 miles) because of damage to some other part of the car. The motor itself apparently could have run for 50,000 km. (31,000 miles), to 60,000 km. (37,200 miles) without difficulty.

Examination of a self-ventilated motor before cleansing discloses that the deposits of foreign matter are not uniform. The commutators are usually very clean because their rotation throws off loose material. Not much more than a film of dust will be found on the upper parts of the armatures, the field coils, poles and brush-holders. Dust containing iron will be found drawn to the pole pieces without, however, causing damage. The bottom of the motor housing will contain more dust, some of it loose and the rest in the form of balls or other shapes up to the size of a small nut. These nuggets have a scaly structure and often have spiky projections. The various shapes are probably due to the mixture of the dust with oil or water and to the tumbling effect caused by the vibration of the car.

The value of internal cooling of the armature is considered questionable, especially, as the required ventilation channels weaken the armature both mechanically and electrically. Instead, the amount of air passing over the surface of armature and field coils can be increased.

The air inlets should not be so low as to suck up rain, sprinkling or puddle water from the trackway. Powdered or granulated snow, because of its entrance in quantity, may find some weak spot in the insulation, but ordinary snowflakes, rain or mist are usually vaporized before they can do any harm. The existing screens and filters cannot be considered as air purifiers but rather as catch-alls for large obstructions.

It is generally best to take air from inside the car, but as two motors require 10 to 15 cu.m. per minute, special means would be required to avoid uncomfortable drafts for the passengers. For motor-cooling, it would not be desirable in winter to draw warm air from the interior. Dresden is experimenting in the other direction by sending warm air from the motors into the car.

The companies replying stated that they overhauled these motors at their customary car-overhaul periods, which varied from 27,000 km. (16,740 miles) to 60,000 km. (37,200 miles). The only item stated by some as tending toward more upkeep was a slightly greater wear of the brushes. The best method for cleansing the motors was said to be that of blowing them out with compressed air at the time of regular overhaul. Intermediate cleansings were mostly unnecessary.

While the self-ventilated motor is not yet all it should be, it is, in the writer's opinion, the type most likely to be the street railway motor of the future.

*Abstract of a paper before the Internationaler Strassenbahn und Kleinbahn Verein, Homburg von der Höhe, September, 1924.

# Track Standards in Central Europe*

BY PAUL GOETZ
Manager Leipzig Street Railway, Leipzig, Germany

ALTHOUGH the replies to a questionnaire on track standards prepared by the writer were more than a year and a half old (owing to postponement of the 1923 convention) and often incomplete, it has been possible to present some interesting facts, which are summarized as follows:

*Track Gage*—The prevalent gage, particularly in the larger cities, is 1.435 m. (4 ft. 8½ in.) as shown by the fact that of the 5,857 km. (3,631 miles) of route operated by 42 replying managements in Germany only 1,689 km. (1,047 miles) was of narrower gage, usually 1 m. (39.4 in.). In Austria, the ratio in favor of standard gage was almost 10:1, four users operating 653 km. (405 miles) of standard gage against three undertakings with 64 km. (39 miles) of narrow gage.

In Czechoslovakia, only one operator with 15 km. (9 miles) had standard gage, the other five totaling 78 km. (48 miles) were of narrow gage. The one Danish property replying had 168 km. (104 miles) standard gage. The six Swedish properties totaled 273 km. (169 miles) standard gage. Three Norwegian systems totaled 37.7 km. (24 miles) standard, while one property had 11 km. (7 miles) meter gage. On the three Dutch lines totaling 298 km. (185 miles) only 2 km. (1.24 miles) are narrow gage. In Switzerland, however, nine roads totaled 184 km. (114 miles) meter gage, as the only standard gage route reporting was the cross-country Thurgaubahn with 43 km. (27 miles).

*Rail Sections*—The reports on rail sections gave 4,845 km. (3,004 miles) of route in grooved rail and 1,010 km. (626 miles) in T-rail, but this shows but a small part of the picture. The standard practice in all the countries included is to use grooved rails in paved construction. In Berlin and other cities new streets are parkwayed in order to permit open track, T-rail construction.

Light rail is going out, the former minimum weights of 20 to 25 kg. per meter (40 to 50 lb. per yard) being replaced by rails weighing 30 to 35 kg. per meter (60 to 70 lb. per yard) and more.

The unnecessarily large variety of rail sections is deplored. During the war the properties naturally were glad to get anything they could. They have, however, since failed to take advantage of the post-war possibilities in making use of adopted standards and consequently saving money. The non-German properties show a better realization of the advantages of standard rail sections.

A noticeable tendency is the preference for rails as high as 180 mm. (7 in.) as the most practicable for block paving as well as for asphalt and wood paving on concrete base. It is poor economy to use a lighter section on routes with sparse traffic, inasmuch as the weight of the rail should be determined more by the weight of the car and the depth of the paving.

Provided the rails are welded and on good foundations, there seems no good reason for going to sections of 200 to 210 mm. (say 8 in.) height. Short lengths of 200-mm. rail have been laid at Dusseldorf, Hamburg and Kiel; and of 210-mm. rail at Munich. The last construction, although using steel ties and concrete foundation, does not show better resistance to wear than track in other large cities. Berlin still has 160-mm. (6.4-in.) rail on 90 per cent of its routes, but since the beginning of 1923 it has been installing 180-mm. (7.2-in.) rail.

Another tendency is toward the use

*Abstract of a paper before the Internationaler Strassenbahn und Kleinbahn Verein, Homburg von der Höhe, September, 1924.

of shallower and narrower grooves, which is helpful in securing more practicable special work. This is true on both German and non-German properties.

*Welded Joints*—In welding new rail the most common practice is to use thermit. Electric welding is preferred for old rail, although the same success would be obtainable on new rail. Electric welding is the only practicable method for "dutchmen" or similar heavy repairs. A pre-requisite for the success of welding is well-schooled labor. Welding is most common in Germany, Denmark, Switzerland and Norway. Hitherto the latter two countries have used thermit only, but the Swiss will use electric welding in the near future.

Special mechanical constructions have not found general acceptance, although the Melaun and Hesse joints respectively are in proponderant use at Berlin and Vienna. A summary of mechanical and welded joint practice shows that on the German properties 62 per cent of the joints were mechanical and 19.4 thermit, the rest being electric weld or special. Austria has 51.3 per cent mechanical and 2.8 per cent thermit, the rest being special. On the Czech properties the proportions were 87.8 per cent mechanical and 12.2 per cent electrical.

The following countries have been using thermit on all new work since 1912, so that their present ratio of thermit alone now stands: Sweden, 14.1 per cent; Norway, 43.85 per cent; Holland, 7.1 per cent; Switzerland, 40.1 per cent. All the rest is mechanical except 1.31 per cent electric welding in Sweden and 0.39 per cent in Holland.

*Special Work*—The standardization of special work has made great progress, the standard curvature for switches is on a radius of 50 m. (162 ft. 6 in.). In Germany, 74.4 per cent (43) of the reporting operators used the standards in varying degrees; in Austria, 87.5 per cent; in Czechoslovakia, Sweden and Holland, 66.6 per cent; in Switzerland, 80 per cent and in Norway 100 per cent.

Curved track usually ranges from 10 to 20 per cent of the total route length, except in the older cities which have many narrow and twisting streets. Heidelberg leads with 50 per cent, but even so large a city as Hamburg attains 30 per cent of curves. Munich has curves of as little radius as 13 m. (42 ft. 8 in.). The effect of curvature on life is not ascertainable because of the wide difference in conditions. Much of the trouble due to excessive curvature is said to have resulted from blindly following the original horse-traction layouts. The author believes that conditions can be alleviated if effort is made to secure the narrowing of sidewalks, the cutting off of corners, the right to lay tracks other than absolutely parallel to the curb, etc.

*Retention of Block Paving in Rail Strip*—There is a tendency toward monolithic paving, but there seems no reason why it should be necessary to use such paving between and alongside the rails. The asserted advantages of monolithic asphalt and wood block paving do not compensate for the greater difficulty of keeping the track structure well drained and free from upheavals due to freezing. In the first instance the demand for a concrete substructure means that the line is out of service for quite a period during the setting; and in the last instance, the upheaved substructure leads to excessive maintenance and a solid substructure transmits vibrations to adjacent houses. The elastic type of substructure, using well-drained broken stone and block paving, is to be preferred.

This discussion does not apply to all of the reporting countries, but rather to Germany, Austria, Switzerland, Denmark and to Zagreb, Jugoslavia. Norway, Sweden and Holland use block paving chiefly, while some Swiss cities have macadam. It is observed that quite a number of railways use but one layer of concrete into which the rails are bedded directly. It would be cheaper in construction, and also easier to replace rails, if they were set on a layer of concrete only 2 to 3 cm. (0.8 to 1.2 in.) thick in combination with an asphalt mixture around which a second layer of concrete would be poured. The use of cement to solidify the substructure is considered an unnecessary expense because careful work will produce uniform density with broken stone substructure and block paving.

The experience of a majority of operators is against the use of rigid track with concrete base. On the other hand, the Vienna Municipal Street Railway has had 10 years successful experience with absolutely rigid track, partly because of the excellent drainage. Of course, such construction requires exceptional skill and is doubtless expensive. In the first Vienna construction, the rails were set in reinforced concrete. The substructure was of a good mixture, but a still richer mix was used for the second layer which was carried to a height of 10 cm. (3.9 in.) above the base of the rails. Then followed a sand cushion and asphalt base for paving block 20 cm. (7.8 in.) high. In a later construction, the concrete was reinforced directly around the rail base because the rails were of greater height than the paving block. It is questionable whether such track could be readily built on pre-existing concrete substructure. In any case it is not believed that any known concrete construction can guarantee the undisturbed position of the rails during the period of their useful life.

The cost of maintaining the substructure and paving in the track strips and of street cleaning therein is almost universally borne by the street railways. Only three properties, all in Germany, reported the use of compressed-air for breaking up concrete. One Danish operator has ordered such equipment and one Swiss operator contemplates a trial.

## Central Association Annual Meeting

THE annual meeting of the Central Electric Railway Association will be held at the Miami Hotel, Dayton, Ohio, Jan. 8 and 9, 1925. The program is being prepared and will be published in a later issue.

# European Progress with Magnetic Track Brakes*

By Jörgen F. S. Barth
Manager Christiania Railway, Christiania, Norway

THERE was a time when cars were so small and light that all braking could be readily done by hand. As vehicles grew larger and heavier, improved hand brakes such as the Ackley and Peacock types were adopted. (Short-circuiting brakes were also added.—Eds.) Next came the magnetic track brake which was free from the handicap of a wheel brake on slippery rail.

The first magnetic brakes appeared some 20 years ago. They were fed directly from the line through a separate switch and were used chiefly for emergencies. Their stops were so abrupt that one might say the place of danger had been transferred from outside to inside the car. To overcome this defect, most magnetic brakes are now wired into the short-circuit braking contacts of the controller so that they go into action gradually. The last braking circuit contact is arranged to take line current direct in order to permit emergency stops.

To obtain definite information a questionnaire was mailed to 244 members, but as only 29 replied, it may be assumed that no more than the latter number are using magnetic track brakes. These operators have a total of 5,342 motor cars and 3,607 trailers of which 1,113 motor cars have magnetic brakes and 141 trailers are so equipped. Only three operators use magnetic track brakes on all of their motor cars. The range of braking effort is between one-half and three-fourths of the car weight.

These brakes always are operated independently of the wheels. The gap between shoe and rail ranges from 3 mm. (0.12 in.) to 20 mm. (0.8 in. Maintenance is trifling as it consists chiefly in replacing worn shoes. Zürich was the only undertaking which reported otherwise. One operator gave his rate of shoe wear as 1 mm. per 1,000 km. (620 miles). Nine operators were of the opinion that the magnetic track brake was less injurious to the motors than a short-circuiting wheel brake the others expressed no opinion. Only five operators observed any rail-tread wear ascribable to the use of the magnetic shoes. Some operators who also use air brakes, said that the latter were satisfactory but cost more to maintain than magnetic track brakes.

On the Christiania Railway three-car (one motor and two trailers) trains totaling 51 metric tons loaded are standard. The following advantages of magnetic track brakes have been found:

1. Powerful braking without disturbance to passengers.
2. Failures are very rare.
3. Skidding (locked wheels) is impossible.

*Abstract of a paper before the Internationaler Strassenbahn und Kleinbahn Verein, Homburg von der Höhe, September, 1924.

4. The chief maintenance is replacement of shoes; but the saving in wheel and wheel-brake shoe wear more than equals this upkeep.

5. Sand has been cut 50 per cent; and it is used only on up grades.

6. To assure this extra-powerful braking, the motorman need only move his regular brake handle somewhat faster.

7. The motorman enjoys the confidence of complete braking control.

8. Accidents are reduced and money saved thereby.

9. There is less strain on the motors.

10. Rail corrugation is perceptibly decreased.

Of course, these advantages are not obtained for nothing. The extra rail wear seems to amount to 1½ per cent of the track upkeep. There is also somewhat less braking current available for car heating compared with ordinary short-circuit braking, but it is hoped to improve this by some changes in connections. It may be added that the Christiania property is in a country requiring car heating some five months in the year. Fog, ice, snow and leaves also make the braking problem unusually arduous.

## Correction of Headway Inequalities*

By Alexander Patz

Manager of the Budapest Street Railways, Budapest, Czechoslovakia

ONE of the important duties of the traffic director is to devise methods of keeping headway inequalities on combination routes within the lowest possible limits, aside from congestion or equipment defect causes. This subject requires the use of higher mathematics to show the relative positions of moving cars of different runs on a section common to all.

As an example, take Rakoczy Street which had been served by 12 routes having individual headways of 15, 12½, 12, 11, 11, 10, 10, 10, 9, 9, 8 and 8 minutes respectively. The combined service had cars bunched at some places and excessive spread at other places, giving an irregularity index of 74.5 per cent. By using 10 minutes as a base headway and dropping out cars here and there, the irregularity index was reduced to 34.7 per cent.

In rush hours, the service should be increased in even multiples by going to a 5-minute headway to double the service, to 3⅓ minutes triple the service, to 2½ minutes to quadruple the service, to 2 minutes to quintuple the service and so on. On the other hand, an even interval during hours of reduced service can be secured through dropping every eleventh car to attain an 11-minute headway, every sixth car to attain a 12-minute headway, every fourth car and fifth car alternately to attain a 13-minute headway, etc. A 10-minute base headway is recommended because it is also easier for the public to remember the local time points as being 1, 2, 3 or more minutes beyond 20, 30, 40 minutes, etc.

To minimize the piling up of cars through any cause whatever, delayed motormen are instructed to report immediately upon reaching a terminal whether trouble on other cars was responsible. These reports are treated as a check upon the report of the motorman whose car was at fault. A higher standard of care is necessary for those cars that are regularly run through congested districts. Pull-in records are divided according to the two chief types of cars inherited from the predecessor private and municipal properties.

A most helpful step toward minimizing breakdowns on the line is found in the practice of posting comparative delay records of the different carhouses every four weeks, the division of troubles showing whether the delay was due to defects in equipment or in operating methods. An efficiency bogey is set up for each type of equipment. Carhouses which exceed the average delays are termed "poor" and those which fall below the average are termed "good."

The operating points on which each depot is judged include the following: Deviation from schedule; man shortage and misses; collisions with own cars; collisions with other vehicles; damage to current collectors through taking switches improperly, etc.; accidents. The equipment defects are classified as follows: Motors; control and resistors; circuit breakers and fuses; current collectors; miscellaneous electrical equipment; wheels and axles; braking; bearings; draft rigging; fenders; miscellaneous mechanical equipment; car scarcity.

In consequence of this searching four-weekly comparison of personnel and maintenance standards, the original average of 16.5 minutes delay per car or train per diem has been lowered to 2.6 minutes.

*Abstract of a paper before the Internationaler Strassenbahn und Kleinbahn Verein, Homburg von der Höhe, September, 1924.

### Midwest Association to Meet in St. Louis

ANNOUNCEMENTS have been sent out by Secretary J. A. Weimer, that the midyear meeting of the Midwest Electric Railway Association will be held in St. Louis, Mo., on Nov. 24 and 25.

Many questions of importance to the electric railway industry in general, and particularly to those properties in the territory covered by the association, will be discussed at this meeting. The detailed program of the two-day session will be announced later.

### National Highway Traffic Association

THE annual meeting of the National Highway Traffic Association will be held in the new clubhouse of the Automobile Club of America, 12 East 53rd Street, New York City, on Tuesday, Dec. 2, 1924. Two sessions will be held, the first beginning at 2:30 and the second at 8 p.m. A dinner open to the public will be served at 6 p.m. in the Grill Room. Requests for dinner reservations should be sent to Elmer Thompson, secretary, Automobile Club of America.

The subjects to be considered include: "Solutions of the Parking Problem in Congested Districts of Municipalities"; "Enforcement of Traffic Regulations by Utilization of a Police Traffic Bureau"; "Methods of Increasing Traffic Capacity of Streets"; "State Fees for Commercial Motor Vehicles as Private and Common Carriers"; "Regulation of Pedestrian Traffic."

### Engineers Will Discuss New York City Traffic Problem

A JOINT meeting of the New York section of the American Society of Civil Engineers and the Metropolitan section of the American Society of Mechanical Engineers will be held in the auditorium of the Engineering Societies Building, 33 West Thirty-ninth Street, New York City, on Wednesday evening, Nov. 19, at 8:15 p.m.

The traffic problem of the city will be the subject of the evening. Those who are on the program to speak are Mayor J. F. Hylan, Richard E. Enright, police commissioner; John Kenlon, chief of the New York City Fire Department; Major Elihu Church, transportation engineer Port of New York Authority, and C. W. Leavitt, consulting engineer.

Preceding the meeting the members of the sections will meet for dinner at the Building Trades Employers' Association, 34 West Thirty-third Street. Dinner will be served at 6.30, so that those attending can reach the Engineering Societies Building in time for the moving pictures which will precede the regular meeting.

## American Association News

### Metropolitan Section Has Enthusiastic Meeting

THE Metropolitan Community Section of the American Electric Railway Association met in New York on Nov. 7, with an attendance of more than 500. The principal speaker of the evening was E. F. Wickwire, vice-president Ohio Brass Company, whose subject was "Friendlyizing," and whose talk was enthusiastically received.

This was followed by motion picture films prepared by the New York Transit Commission, entitled "The Straphanger," and showing the crowded conditions of the subways and the problems confronting the companies in trying to solve the difficulties.

The membership committee reported a total enrollment of 569 members, but later it was announced that the membership committee's report was made up at 5 o'clock and that since then up to 8 o'clock the enrollment had increased to 650.

This is the second meeting of the Community Section and the enthusiasm seems to bear out the feeling of President Thompson that the membership will soon reach the 1,000 mark.

# The News of the Industry

## Commission Has Right Over Fares

### Victory for Virginia Railway & Power Company in Decision of Commission Over-ruling City's Fare Plea

Objections of the city of Richmond to the fixing of rates and valuation of property of the Virginia Railway & Power Company by the State Corporation Commission have been overruled in an order entered by the commission. It was the unanimous opinion of the commission's members that that body has the right to value the power company's property and fix rates over the traction lines, despite franchise provisions.

The order over-rules the petition of the city to dismiss the recent request of the company for such a valuation in the Richmond division. It also over-rules the city's demurrer in the case.

The company has been ordered by the commission to proceed at once to submit facts and evidence bearing upon the value of its property for rate-making purposes and otherwise proceed in the case in accordance with its petition.

Of the importance of the case the commission said:

> The case is one of great importance, and that it is not free from difficulty and doubt is manifest from the divergent views entertained by learned counsel on each side and the copious and able briefs filed, but we feel that, under the law, there is plenary jurisdiction in the commission, and we feel confident that such a holding is conducive to the best interests of the State of Virginia and the people thereof generally.

Jurisdiction of the commission was challenged by the city of Richmond on four grounds, as follows:

> 1. That all of the four main franchises granted to the predecessor companies of the petitioner, and the extensions of these franchises, constitute inviolable contracts for the fixing of rates during the life of the franchises binding upon the State and protected by the federal and state constitutions.
>
> 2. That the General Assembly has vested the city with authority to prescribe such rates within the proviso of section 156 (b) of the Constitution.
>
> 3. That the matter is *res adjudicata* as between the city and the Richmond Passenger & Power Company, predecessor of the petitioner, and between the city and the Richmond Traction Company, predecessor of the petitioner.
>
> 4. That the company is precluded by estoppel or by waiver from litigating the question before Oct. 10, 1924.

The commission took up each of these contentions in turn and disposed of it. It said in effect that after very careful consideration of the constitutional and statutory provisions which seem to it to be pertinent and of the very able and comprehensive briefs filed by counsel, that it has jurisdiction to make proper investigation and to value the railway in Richmond as a whole, to determine whether or not the existing rates are just and reasonable, and if it finds them unjust and unreasonable, to fix rates which are just and reasonable.

In addition to disposing of the four contentions previously noted the commission set down the following general propositions:

> 1. The tendency of the decisions all over the country, including Virginia, has for some time been, and is, toward recognizing the police power of the States as to rates of public service corporations as largely inalienable.
>
> 2. A like tendency has recognized, and does recognize, the advisability in the interest of the public of a central, unified, uniform and general control as to rates.
>
> 3. As to rates of a city transportation company and rates of many other city public utilities, there is manifestly more definite interest in the people of the State generally in the former than the latter.
>
> 4. Every practical consideration, in view of the complicated situation in the city of Richmond, as well as considerations of convenience and public policy, lead to the conclusion that there should be a general and uniform control as to rates of transportation in the city of Richmond, and where reason clearly demands a certain course, the law, which is based on reason and exists for the general welfare and the best interests of all, will generally be found to follow. Certainly the law should be held to follow the dictates of reason and policy and the interests of all the people, unless it clearly is contrary to such dictates.

The petition of the company asking the commission to determine the "fair value for rate-seeking purposes of its transportation system in Richmond and extending into Henrico and Chesterfield Counties and to fix such rates and charges as shall be just and reasonable" was filed on April 17. The city filed a petition asking that it be made a party defendant on May 7 and a demurrer on the same date.

## Jitneys Made a Political Issue

### Springfield Operators Profess to See Opportunity to Return by Election of Mayoralty Candidate Favorable to Them—Railway Now Operating Buses and Is Prepared to Expand Co-ordinated Service

THE transit situation in Springfield, Mass., presents a picture of seeming contradictions. Not since last May have any buses been run in that city in local service except by the Springfield Street Railway. At that time Mayor Leonard put into effect his rule against jitney operation. A year ago he said that he would do this, so that the jitneys had lived only on sufferance since that time. A trial was made of operation on a plan of voluntary contributions, but this was merely a gesture. The jitney men felt that there was no hope for escape from the ruling of the transportation board, made up of five members of the City Council and the Board of Aldermen, but the jitney men were determined to compel resort to the law on the part of the city officials.

While jitney competition with the Springfield Street Railway was lively, it never reached proportions attained in some other cities. It is estimated that only about 5 per cent of the total number of passengers hauled in the city were handled by the jitneys. The jitney men contend, of course, that this business was largely created by them. Too many variable factors apparently enter into the case to determine definitely whether this contention is correct. In any event, even spokesmen for the jitney men admit that the service they gave was not all that could be desired either as regards headways or types of vehicles operated. Better buses, they say, would have been put into service except for the threat of their complete expulsion from the city, which, like the sword of Damocles, hung over their heads a year. Opponents of the jitney are not so sure of this.

The bus men made their fight before the Mayor and lost. Mr. Leonard proved obdurate. One thing has been established beyond doubt. The Mayor is determined. He is not contemptuous of public opinion, but he is a man of decided opinions. A minority, organized or unorganized, has no terrors for him. Both friend and foe pay him tribute on this score. On more than one occasion he has brought down upon his own head the scorn of a particular part of the public which he has opposed, but in every instance the general opinion is that his public acts have been grounded on the conviction that he acted in the best interests of the city. On the other hand, partisan politics is charged by the jitney interests against the members of the Transportation Board or a majority of the members of that committee. This charge is, of course, stoutly resented by the members of the board. The board merely concurred with the Mayor in his decision that "the competition of independent jitney buses must be eliminated for the public welfare."

Anyway, the whole matter has got into politics. The local election in Springfield does not occur until Dec. 2, but the events incident to the national election on Nov. 4 were in some cases overshadowed by the impending local primaries which follow closely upon that event. Mayor Leonard has no desire to remain in public office, so that as an issue his recent acts do not enter into consideration except in so far as his successor might be inclined to follow the course of action by him which has resulted in the elimination of the jitneys.

In the early stages of the campaign

there were three prospective candidates, Josiah Dearborn, present city solicitor under Mayor Leonard, and Fordis C. Parker, chairman of the Board of Public Works, both Republicans, and Richard J. Talbot, counsel for the jitney men, an independent in politics and at various times a Republican and a progressive follower of Roosevelt. Every one knows where Mr. Talbot stands. He is for the jitney, first, last and all the time. Necessarily, he is a partisan. He is probably not the radical partisan that some of his opponents are inclined to make him out to be. It is certain that he will run for office. He may run as a Democrat if he gets the indorsement of that party, but run he will in any event. He can run as an Independent, for he has canvassed the situation and has indorsements sufficient to assure him the right to run. If he runs independently, Mr. Talbot will make the issue one of better transportation, meaning, as he sees it, that the jitneys have a place in the transportation field of that city. He says the jitneys are willing to go back at a 6-cent cash fare with five tickets for 25 cents. The jitneys formerly charged 7 cents. This is the same fare that was charged by the railway, but since the increased pay was awarded to the railway men, the railway fare has been made 10 cents cash, with three tickets for 25 cents.

Mr. Parker has promised that in the event of his nomination by the Republicans he will have an expert appointed to look into the transportation situation, and that if a report is made to the effect that the Springfield Street Railway is not doing all in its power to afford proper service, he will favor the return of the jitneys. Mr. Dearborn, the other candidate, did not at first commit himself to any fixed policy with respect to transit matters, but in a speech which he made on Nov. 3 indicated that he believed in the necessity of preserving the railway. He thought that a city-wide committee should be appointed to determine the minimum number of additional buses required for reasonable transportation and that the railway should be afforded a chance to indicate its own willingness to meet the situation failing which licenses should be issued to the jitneys up to the number of vehicles regarded as necessary. At the Republican caucus on Nov. 11 Mr. Parker was nominated. The Democratic primary is on Nov. 14.

But the story isn't all one-sided. Stories of this kind seldom are. The province of the outside observer is to write about them dispassionately. In the eyes of the participants, however, this he seldom does, for either one side or the other and sometimes both sides see matters through a glass darkly. One thing is certain above all others, the spirit of civic consciousness in Springfield is very highly developed. In view of the controversy over the right to run jitneys, this statement might at first be regarded as a contradiction, but it is nevertheless true.

As the railway sees it, the bus prior to last May was sucking its life blood. The story of increased railway operating costs in recent years is an old one. As proof of the correctness its contention of the narrow margin which has been left to it on which to operate, the railway cites the verdict favorable to it by the State Department of Public Utilities permitting it to increase fares. This increase was put into effect on Sept. 21. Previous to that time the fare was 7 cents. Fares were advanced with the sanction of the state body only after an arbitration award had been rendered increasing the pay of trainmen. Riding has fallen off, but an opportunity has not yet been afforded to determine what the real results are likely to be. At any rate, the railway agreed a long while ago to put in buses, and this it has done. At the present time it is operating nine up-to-date buses (one Stewart, one Yellow Coach, one Selden, four Garfords, one Federal and one White) on four routes giving adequate service to territory in which the railway lines do not operate. A general system of transfer is in effect which permits riding in one general direction, and cars and buses alike exchange transfers. The fare on the buses is the same as on the cars.

The railway stands committed to an extension of this program of co-ordination. Its contention is that it does not fear competition, but that competition means operation of two systems of transport under the same conditions. It has about 195 miles of track. Practically all of the various lines are operated over a stretch of Main Street extending from Carew to State Street, a distance of about a mile. The scheduled running for this stretch through the center of the business district during the rush hours is 12 minutes, but this is seldom achieved, and on stormy nights 30 minutes is frequently taken to make this run. The railway would gladly reroute some of its lines, but as Main Street is the principal business artery, the commercial interests have frowned on any such proposal.

This is just one of the contradictions in the situation to which reference was made in the beginning. The general feeling is that the railway did well to continue for as long a time as it did on a 7-cent fare.

The attitude of Mayor Leonard and the Transportation Board must be taken as reflecting public opinion, the proponents of the bus to the contrary notwithstanding. Critics of both are to be found, however, in all walks of life. It is no reflection upon the bus as a vehicle of transport to say that many harsh words were said about that vehicle as independently operated. There is a supervisor of traffic to look after things in the interest of the city, but many of the buses were not up to date and they were generally operated indifferently. To this the spokesman of the jitney men, as said before, replies that the threat of compulsory suspension which hung over the heads of the jitney men militated against their doing much better.

Business men everywhere express the hope that the coming election will result in the matter being settled for all time. They are not optimistic of that outcome, but the general opinion is that the people are too well informed to permit the jitneys to return on anything like the basis upon which they were formerly run.

## One-Man Car Issue at Dayton Before Court

District Judge Smith Hickenlooper on Dec. 1 will hear a motion filed by City Attorney J. B. Harshman of Dayton, Ohio, asking the dismissal of the case against the use of one-man cars in Dayton on the grounds that no federal question is involved.

The five railways operating the cars in Dayton secured a temporary injunction against the city in the federal court the latter part of January, 1924, and the case has been pending since.

At the election in Dayton on Nov. 2, 1924, residents of the city voted to discontinue the one-man car service in the city. An ordinance was immediately drafted giving the railways 90 days in which to organize the two-man car system. Another extension of 30 days was granted. This put off the date of the discontinuance to Feb. 1, 1924. Upon a petition filed in the federal court by attorneys for the companies a temporary injunction was granted restraining the city from enforcing the ordinance until the case was settled.

## Rapid Transit Referendum Suggested for Chicago

A resolution for a referendum of Chicago voters in February on the subject of a city-built subway has been introduced in the Chicago City Council by Alderman Kostner. He expressed the belief that the administration would be unable to get any of its numerous transportation plans ready for the February ballot because of the intention to pass on all details first. He wants simply a vote which might be construed as a mandate to build some kind of tube system under downtown Chicago, and his preference is for one linking with the elevated and surface lines at the north and south ends of the loop.

## Fares Cut in Fitchburg to Stimulate Riding

Officials of the Fitchburg & Leominster Street Railway, Fitchburg, Mass., have announced that the fare reduction on the so-called Southside lines of the company has been approved by the Department of Public Utilities and has been put into operation. The same reduction has been put into effect on the Westside line in Leominster. Passengers still pay a 10-cent fare, but they receive a return check. If the check is used the same day it is issued patrons make the round trip for 10 cents, instead of 20 cents. No transfers are issued and the check is good only for that line. The reduction in fare is an experiment. It will not be continued if riding on the line is not stimulated.

## New Fare in Force in Boston

The Boston Elevated Railway put its 6-cent fare into operation on Nov. 5 on its short-haul lines. On the bus lines operated by the elevated additional steps have to be taken to instal the 6-cent fare, it being necessary to obtain the consent of the municipalities in which the bus lines operate.

## Bus Tax Amendment Fails in California

An amendment to the constitution of California designed to place bus companies in that state on the same basis of taxation as the other public utilities was defeated at the recent elections. The measure lost by a vote of 75,000 out of a total of 750,000. The amendment was sponsored by the California Motor Carriers' Association. Its defeat is attributed principally to the opposition of the farmers and local taxing bodies and to the vote of a section of the public that is said to have regarded the impost as insufficient.

"Amendment No. 1" as it was called, was officially designated on the ballot as "State Taxation of Highway Transportation Companies." It was presented by the association to the voters as a means of equalizing the taxes of bus lines and putting them on the same basis of taxation as the other public utilities that contribute the chief revenues of the State.

It provided for the substitution of a state tax on gross earnings for other taxes to which the bus lines are now subject but did not exempt them from the state gasoline tax. It would also have maintained the present state rate of 4 per cent on gross earnings until the rate was changed by the Legislature.

The Motor Carriers' Association now represents the interests of 677 motor transportation lines in California—substantially the entire highway transportation industry that has been built up in the state within the past two decades and which last year accommodated more than 29,000,000 passengers.

## Pittsburgh Pass Puts Sunday Back on Traffic Map

Nov. 2 was the second Sunday of the "Sunday-only" pass of the Pittsburgh Railways. The results attained indicated that all that was needed was to give the public of so large a community a chance to understand what the privilege meant.

On Oct. 26 17,500 passes at 25 cents each had been provided, but so great was the demand that most conductors were sold out by noon. The number actually sold was 15,179. This was equal to 9.1 per cent of the receipts. On Nov. 2 pass sales amounted to 33,168, or 18.8 per cent of the receipts.

The company had already in operation a liberalized Sunday transfer costing 10 cents or 20 cents for just one round trip. The effect of the pass the first Sunday was to cut the sale of these transfers from a former average of 18,000-19,000 to 16,013. On the second Sunday, despite the enormous increase in the sale of 25-cent passes good for any number of rides, 12,258 specials were sold. This itself was double the number sold before the 10-cent transfer was liberalized to give a full 8½-cent ride on each side of the center. It may seem curious that so many persons would not pay an extra nickel for unlimited service, but it is likely that even if the number of specials decreases there will still be a market for this particular transport bargain.

The Sunday pass innovation has met with much praise from various elements of the public. Aside from the good-will effect, the revenue has shown a most gratifying increase. The second Sunday, which really gave the pass its first opportunity, produced $42,786. This was $4,230 in excess of the same Sunday last year and $2,500 in excess of the average of the four Sundays preceding Nov. 2.

## Bus Bids Made in Indianapolis

After nearly three hours of arguments on the part of those who participated in a recent public hearing the Board of Park Commissioners at Indianapolis has indicated that if the Indianapolis Street Railway does not submit a definite proposal for handling transportation on Capitol Avenue north of Fortieth Street within two weeks, the proposal of the People's Motor Coach Company would probably be approved. Robert I. Todd, president of the railway, said a definite proposal will be submitted. Mayor Shank asked how soon each could begin operation on Capitol Avenue.

"I'll guarantee them in sixty days," Mr. Bowman answered.

"I'll guarantee them in thirty days," Mr. Todd retorted.

"This question of bus transportation is becoming serious," Mayor Shank said at one point. "Everyone knows that without a street car system the city wouldn't be worth a nickel. However, I think that Mr. Todd should promise to give relief immediately to people in the north part of Indianapolis who demand some method of transportation."

## $25,000,000 Rapid Transit Program Outlined for Philadelphia

Plans for a Chestnut Street surface car subway and transit service over the Delaware River bridge were outlined on Nov. 10 at a special meeting of the city's Transit Commission by Thomas E. Mitten, chairman of the board of directors of the Philadelphia Rapid Transit Company, who suggested that the city finance its construction.

The plans provide for a subway under Chestnut Street from Fifth to Twenty-third Street, where it would continue as an elevated line westward over the Schuylkill River, and thence on Sansom Street to Thirty-seventh Street. There would also be underground sidewalks from Sixth Street to Nineteenth. Mr. Mitten estimated the cost of the subway at about $20,000,000 and the sidewalks about $5,000,000. He said if the city authorized the construction the transit company would undertake to pay the interest and sinking fund necessary to retire the $20,000,000 during the life of fifty years, bonds to be issued by the municipality.

On Nov. 13 the company offered to spend $500,000 to build tracks across the Delaware River Bridge and a loop in Camden, to maintain those tracks, to provide equipment and to furnish service to and from Camdem at the same rates of fare and with the same transfer privileges that may prevail in Philadelphia, provided it received exclusive operating rights.

## Municipal Bus System Knocked in Head

New York City has no right to own and operate buses, Corporation Counsel George P. Nicholson stated in an official report to the Board of Estimate of that city, Nov. 10.

Comptroller Charles L. Craig, whose bills introduced into the Municipal Assembly recently to provide for city ownership and operation of buses were the reason for the corporation counsel's report to the board, declared that Mayor John F. Hylan and his supporters were attempting to intimidate the Municipal Assembly. He said that the corporation counsel's report was an effort to defeat his bus bills by convincing the members of the local assembly that they had no legal right to pass them. On Nov. 14 Mr. Craig again insisted that the city has the right to legislate on the bus matter just as the Legislature had this exclusive right before the passage of the home-rule act last winter. Another hearing is set for Nov. 17.

## I. T. S. Line Renews Wage Agreement

Employees and officials of the St. Louis Electric Terminal Railway, a subsidiary of the Illinois Traction System, operating between St. Louis, Mo., and Granite City, Ill., via the McKinley Bridge, reached an agreement regarding wages and working conditions at midnight on Nov. 7. The settlement calls for a continuation of the wage scale that expired on Nov. 1.

The workers had demanded an increase from 58 cents to 61 cents an hour effective from Oct. 1. Company officials held out for a decrease of 5 cents an hour. It was finally agreed that the old wage scale and working agreement should continue in effect until Nov. 1, 1925.

## $9,531,204 in Subway Contracts Awarded in New York

The Board of Transportation, which now is charged with responsibility for all new subway construction and routing in New York City, on Nov. 11 awarded three contracts, aggregating $9,531,204, for the construction of the extension of the Fourteenth Street-Eastern District subway from Boerum Street and Bushwick Avenue to Wyckoff Avenue and Halsey Street, 2.14 miles, in Brooklyn. The contracts, in accordance with the law, were submitted to the Board of Estimate for approval.

To expedite construction the extension is to be built in three sections. The first section, 0.7 of a mile, was awarded to the Underpinning & Foundation Company for $2,733,227. The second section, 1.85 mile, was awarded to the Oakdale Contracting Company for $3,595,038. The third section, 0.59 of a mile, was awarded to the Oakdale Contracting Company for $3,202,939.

Under the provisions of these contracts the route will have to be sufficiently completed for the operation of trains within twenty-eight months and finished entirely within thirty-three months from the time that work is commenced by the contractors.

## First Railway Bus Line in St. Louis Opened

The St. Louis Motorbus Company, a subsidiary of the United Railways, St. Louis, Mo., opened its first bus line on Sunday, Nov. 9. The line operates on Natural Bridge Avenue from the end of the Natural Bridge division to Line Lawn in St. Louis County, intersecting the Union boulevard line and the Kirkwood-Ferguson division.

For a 10-cent fare passengers are furnished a transfer to the United Railways city street cars, while street car patrons who desire to transfer to the buses receive a transfer for an extra 3-cent fare, as the city car fare is 7 cents.

Four single deck buses constructed by the White Company have been installed on the line. Each bus holds twenty-nine passengers. The driver collects the fares as the passengers enter.

## Electrification and Motor Haul Data Sought by I.C.C.

In its annual report form, to be sent out to all railroads about Dec. 1 and returned by March, 1925, the Interstate Commerce Commission will request data on the use of electricity for motive power, and information regarding gasoline-propelled railroad cars. The commission will also seek to find out the results attained with the use of motor trucks by the companies as supplementing regular service. Some of the country's railroads, including the Pennsylvania, utilize motor trucks on short hauls.

The most recent available figures of the commission show that the eastern part of the country has 286 electric locomotives in heavy railroad operation; the south has 17 and the west has 69. Most of the big railroads of the country have portions of their lines electrified now.

## Joint Operation in Texas a Success

The Dallas-Denton line of the Texas Interurban Company has not produced the business expected of it by the management. This statement is based on returns for the first month of operation. According to General Manager Richard Meriwether, the combined traffic is barely enough to pay operating expenses, but the returns from freight and express have been good. He is quoted as follows:

> The first month the line has been in operation has demonstrated the practicability of using the same tracks for steam and electrically driven cars, but aside from that the results so far are rather disappointing. We hope the business will increase as the people of the territory become familiar with the service. There are enough people in that territory to produce a satisfactory business, and we are confident it will come to us when everybody along the line begins to use the interurban cars.

The Texas Interurban Railway is cooperating with the Missouri, Kansas & Texas Railroad in operating a joint line between Dallas and Denton. Joint operation was planned when the interurban company, in fulfilling a contract with the city of Dallas, decided that Denton was the best town in the surrounding territory to include in the network of connecting electric lines. A proposition was made to the railroad company to rent its track, obviating the construction of a parallel road.

A joint dispatching system, under the supervision of the steam line company, is maintained. Each electric passenger train and each steam passenger train is considered first-class, the electric express train second class and the steam freight trains third class.

The interurban company pays a stipulated rental monthly for the use of the track, and in addition pays a sum for the maintenance of the right of way, and its pro rata share of the dispatching cost.

## Results with Trackless Line at Baltimore Disappointing

The United Railways & Electric Company, Baltimore, Md., is seeking a way to minimize the loss on the trackless trolley between Gwynn Oak Junction and Randallstown. When the trackless trolley was first proposed, Liberty Road residents made a contract with the railway in which they agreed to make up deficits in the operation of the line to the extent of $10,000 the first year, $7,500 the second year and $5,000 a year thereafter, until $37,500 had been paid.

The trolley was placed in operation in July, 1922, and the Liberty Road residents have had to pay the first two years' installments on the deficit guarantee. The contract has three years to run.

A statement by the railways says:

> The United Railways has been steadily losing money on this line.
>
> The guarantee has never equaled the deficit. Our officials have been conferring with officials of the Public Service Commission for some time in an effort to work out a satisfactory solution.
>
> The company has no intention of abandoning the territory. We will continue to give the people there adequate transportation service, but some way must be found to minimize our losses.
>
> Operating economies will have to be brought about. Perhaps that can best be done by substituting gasoline buses.
>
> The company has no intention of asking for an increase of fare on the line, nor an increase of the guarantee fund posted by the citizens there.

## Buses Run by Railway at Sapulpa

Bus service has been substituted for railway service in Sapulpa, Okla., and started between Mounds and Okmulgee. Electric railway service in Sapulpa, a town of 11,600, could not be made profitable. Two short lines will be abandoned entirely and about 1¼ miles of track probably will be removed. The Mounds-Okmulgee buses will be operated pending completion of the electric railway extension from Mounds to Okmulgee, after which the buses will be used as feeders to the electric line on such routes as offer possibility of developing business. J. A. Frates, vice-president of the Oklahoma Union Railway, states that the company expects to add buses as line feeders as rapidly as the electric line is extended until all tributary territory is given adequate service and annexed by interurban lines to the system being developed by that company. The bus service is being given in the name of the Union Transportation Company.

## New Buffalo Bus Line Starts

Double-deck buses were placed in service on Delaware Avenue, Buffalo, N. Y., on Nov. 2 by the International Railway. The fare is 10 cents. This line will be extended to Kenmore Avenue at an early date, and the Delavan Avenue line will be opened as soon as buses can be secured. Free transfers are given with connecting street car lines in a forward direction.

Buses now in use are of the open-top type, seating 67 passengers, as now operated on Fifth Avenue—New York, and Roosevelt Boulevard—Philadelphia. These buses, however, are for temporary use, and will be replaced in the early spring by the Mitten-Management bus, which has a front exit, inside stairway, semi-enclosed top and electric drive. The company says:

> Traffic congestion is becoming more and more alarming in Buffalo. It will be greatly relieved by a proper use of the bus. Sixty-seven seated bus passengers occupy about the same street space as 4 private car passengers, and when the automobilist learns of the speed and comfort possible for a 10-cent fare, he will hesitate before assuming the cost of bringing his private car into the downtown traffic, and inflicting upon the public generally the delays caused by over-congestion in the city streets. A regular motorbus service will appeal to the economical motorist as well as the comprehensive city planner.

## More One-Man Cars for Milwaukee

Following a series of hearings covering nearly a year before the Railroad Commission on the petition of the Milwaukee Electric Railway & Light Company to introduce one-man cars on its Clybourn Street line a permit has been granted to establish the service. Testimony introduced before the commission showed that the company has found it absolutely necessary to reduce operating expenses wherever possible in order to give car riders adequate service at a reasonable fare.

The equipment to be used on the Clybourn line will not be like that in use on the three other one-man lines in the city. The company proposes to equip the Clybourn Street line with cars of the rear-door type so as to facilitate the unloading of passengers, especially in the downtown section of the city.

As indicated in the ELECTRIC RAILWAY JOURNAL for Nov. 8, page 821, an application by the company to extend its one-man car service to the Walnut Street line is now pending before the Railroad Commission.

## More Bus Permits Issued to Public Service

Permits have been issued by the Board of Public Utility Commissioners of New Jersey to the Public Service Transportation Company for the operation of 17 buses on the Passaic-Garfield-Lodi route. This route is about 4 miles long. It parallels on the same streets

the tracks of the Public Service Railway, of which the bus company is a subsidiary. The rate of fare is to be 5 cents from Burgess Place, Passaic, N. J., to the end of the line in Lodi. The railway has discontinued its trolley service on the Main-Lodi line in Passaic, Wall and Main Streets and Passaic Avenue and on its private right of way from Main Street, Lodi, to Lodi Junction, and has substituted buses.

## Co-ordination Proposed at Topeka

A. M. Patten, general manager of the Topeka Railway, Topeka, Kan., has admitted that plans have been discussed looking toward the establishment of a service with buses by his company in co-ordination with the railway lines. The tentative plans now being considered are for the buses to enlarge the trade territory of the North Topeka merchants by extending operation beyond the city limits.

Whether the buses are to be operated from the ends of the present lines or whether they should operate from the south side of the river, the street cars being eliminated north of the river, still is a matter to be decided.

It is stated that the railway officials are considering a plan whereby the street cars would be operated to the Union Pacific station and passengers for other than the trains, to be transferred there to buses.

The Topeka system is controlled by the Illinois Power & Light Corporation, which is successfully operating buses in co-ordination with its railways lines in other cities, notably Wichita, Kan., and Decatur, Ill.

## Interurban Passengers to Go Into Detroit by Bus

Interurban cars of the Detroit United Railway will probably cease to operate at the Detroit city limits on Dec. 1 under a plan to put a system of buses into operation for transporting interurban passengers from the city limits to the company's main terminal station at Jefferson Avenue and Bates Street. The company's outbound buses will be reserved for interurban car passengers.

Incoming passengers will leave the cars at sub-terminals, to be established by the company, and there board buses. Outbound passengers will be transported in buses from the interurban station in the business center of Detroit to the city limits to board the cars at the sub-terminals.

After the new bus system is put into use the parlor cars of the railway will be the only interurbans to proceed over the city streets to the main terminal station.

At least 50 buses will be placed in service. They have been ordered from the Yellow Coach Company, Chicago, and are to be of the single-deck type.

The D.U.R. already has buses in service on its Trenton division covering the entire interurban route. A sub-terminal and transfer station on Gratiot Avenue is being completed and will be the first one used. It will be followed by two others so that the buses on the Pontiac and Mount Clemens division will not go farther than the city limits.

# News Notes

**$169,000 Spent in Grand Rapids.**—Keeping pace with the development of Grand Rapids, Mich., the Grand Rapids Railway up to Nov. 1 spent $169,000 this year in improving its service. The largest projects were in the downtown section to relieve traffic congestion.

**Fare Increase Sought for Interurban.**—The Virginia Railway & Power Company, Richmond, Va., has petitioned the Virginia State Corporation Commission for an increase of fares on the Richmond-Petersburg interurban electric line. The company is not receiving a reasonable return, the petition alleges.

**Wisconsin Town Bans Bus.**—Acting on the conviction that street cars offer all the people the safest and cheapest form of transportation, the village board of Port Edwards, Wis., has passed an ordinance which it believes will protect the Wisconsin Rapids Street Railway, an 8.25 mile line, against unregulated bus competition. The ordinance requires the payment of $5 a day for each bus operating on the streets in the village. Violators of the ordinance will be fined from $1 to $100 for each offense, or may be sent to jail for 90 days.

**North Shore Purchase Postponed.**—The Board of Estimate of New York on Nov. 7 decided to put off the matter of approving the contracts for the purchase of the rights and interests in the New York & North Shore Traction Company for $50,000 and also the question of authorizing Controller Craig to buy the carhouse and yards on State Street, Flushing, for a sum not exceeding $15,000.

**Extension of Franchise Sought.**—A request for a 20-year franchise to operate cars in the city of Piqua has been filed with the city by the Western Ohio Railway. The company's franchise expires in two years.

**Offices of St. Joseph Company in New Location.** — The St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., has opened for business in its new quarters in the Tootle Building, Sixth and Francis Streets. The offices of the general manager, superintendent of railways, engineering, accounting, claim and publicity departments took up quarters in the new building some time ago. The company has occupied its present quarters since the old Tootle Building at Sixth and Francis Streets was destroyed by fire two years ago. In its new location the company will occupy all of the west half of the first floor, fronting on Francis Street, and the entire second floor. The salesrooms will be on the first floor.

**School Buses Run by Railway.**—Two morning and evening school bus runs for the exclusive use of pupils of the Fremont High School, Los Angeles, Cal., were started by the Los Angeles Railway on Nov. 3.

**Deadlock on One-Man Car Operation.**—The city of Quebec and the Quebec Power Company, Ltd., are deadlocked on the question of the number of men who will operate the street cars of the city. Unless the company meets the demands of the city the fare will, on and after Nov. 15, revert to 5 cents, the rate charged in 1919. At present the rate is 7 cents.

**Electric Extensions Planned.**—It is reported that a steam railway line, with electric extensions, is being planned to span the oil fields, east and west, of northern Oklahoma. C. E. Burlingame, Bartlesville, is head of the temporary organization. The company is to be capitalized at $1,000,000.

**More Bus Permits Sought.**—The Los Angeles Railway Corporation, Los Angeles, Cal., has applied to the Railroad Commission for a certificate to operate bus service along a portion of Florence Avenue from the city of Los Angeles to the city of Huntington Park.

**Insurance Policies for Nashville Employees.** — The Nashville Railway & Light Company, Nashville, Tenn., through J. P. W. Brown, its general superintendent, has announced that it had issued life insurance policies of from $500 to $1,500 to its 1,089 employees. At the same time, B. C. Edgar, vice-president and general manager of the Tennessee Electric Power Company, of which the Nashville Company is a subsidiary organization, announced that a total of 2,800 employees had been given similar policies totaling $2,000,000. Protection by these policies became effective on Nov. 1. The contract for this insurance was given to the Provident Life & Accident Insurance Company, which has its home office in Chattanooga.

**Tells About Railway and Bus Operations.**—Service to the public was stressed by the Altoona & Logan Valley Electric Railway and Logan Valley Bus Company in connection with the Better Homes Exposition staged by Altoona, Pa., merchants and corporations. The railway had a booth with company employees in attendance. The booth contained a large map showing the territory over which the company operates, giving the trolley lines and bus routes. Numerous placards contained company statistics and gave the salient features of traffic conditions. Other bulletins announced that the Logan Valley trolley cars and buses hauled 19,000,000 passengers in one year, the cars traveling 3,000,000 car-miles. The company used 21,000 tons of coal, employs 360 men and women, operates 132 cars on 576 miles of track, and it informed the visitors through a placard that wages have increased in the past ten years by 100 per cent, materials have increased 70 per cent and fares but 40 per cent.

**Bridge Will Be Constructed.**—The vehicular traffic and street car bridge across the New Basin Canal at Carrollton Avenue in New Orleans, La., will be built. The New Orleans Public Service, Inc., sought to have it erected, and offered to advance the cost of construction, estimated at $150,000, to be reimbursed subsequently by the city of New Orleans. Action on the matter was delayed by a ruling of the City Attorney's office, which has been removed. The bridge will have a double street car track, with ample space on either side for vehicles and two lines of traffic.

# Financial and Corporate

## Surplus Increased

**Montreal Tramways Has Surplus of $548,695 Compared with $347,553 in 1923 and $187,947 in 1922**

The thirteenth annual report of the Montreal Tramways, Montreal, Que., shows separately the results obtained from the operations under the contract with the city and the share of the gross revenue accruing to the company under the provisions of the contract and its disposition. The report of the president and directors was recently submitted to the shareholders. It is for the year ended June 30, 1924.

Operations under the contract show a gross revenue of $12,463,799, which included $12,131,181 for passenger earnings. The total operating expenses amounted to $8,875,224 and the net earnings were $3,588,574. After the distribution of the net earnings, the total revenue from the contract, together with the operating profit of $48,555, equaled $2,358,448. An amount of $181,431 was carried direct to "Reserve for Financing." To the city of Montreal for the yearly rental the sum of $500,000 was given, and for payment on account of accrued rentals unearned in previous years $548,695, which, added to the company's revenue from the contract and expenses for financing, makes $3,588,574. The city rental up to June 30, 1924, amounts to $3,192,694, of which sum there has been earned $2,809,056, leaving a balance of unearned rental payable as earned of $383,638.

The share of the gross revenue for the year accruing to the company, together with the miscellaneous revenue from other sources, shows a distribution of total revenue of $2,449,175 and total expenses of $1,885,621, leaving a net income of $563,554. Subtracting a dividend total of $400,000, the surplus for the year was $163,554. A sum of $592,979 is added to it for the surplus at June 30, 1923, giving a total of $756,533. There has been charged against this account $87,780 for the value of discarded property, leaving a balance in the general surplus account of $668,753.

During the year the company expended on new construction $1,145,505 and has written off capital account for the value of property discarded $377,466, making a net addition to capital value of $768,038. During the year the company purchased 25 new motor cars and 25 new trailers.

The efforts of the company to meet demands upon its system is reflected in the large amount of new construction work carried on throughout the year.

A comparison of operation for the year ended June 30, 1924, with the previous year is given in the accompanying table.

The annual meeting of the company was held on Nov. 5. The directorate is now composed of Julian C. Smith, president; Howard Murray, Gordon W. MacDougall, George H. Montgomery, J. L. Perron, William C. Finley, Col. J. E. Hutcheson, Lorne C. Webster, Beaudry Leman, Senator Casgrain. Mr. Hutcheson, the general manager, was in addition made a vice-president.

| | Year Ending June 30, 1923 | Year Ending June 30, 1924 |
|---|---|---|
| Gross receipts | $12,056,355 | $12,463,798 |
| Operating expenses and taxes | 6,099,993 | 6,246,889 |
| Operating profit | 48,304 | 48,554 |
| Maintenance and renewals | 2,492,792 | 2,579,779 |
| Total | 8,641,090 | 8,875,224 |
| Balance | 3,415,264 | 3,588,574 |
| Allowances due company: | | |
| Six per cent on capital value | 2,177,177 | 2,177,177 |
| On additions to capital | 164,973 | 175,918 |
| Six per cent on working capital | 2,530 | 5,351 |
| Financing expense | 181,431 | 181,431 |
| Total | 2,526,113 | 2,539,879 |
| Balance Dr. | a889,151 | a1,048,695 |
| Payable when earned: | | |
| City of Montreal rental | 500,000 | 500,000 |
| Contingent reserve fund | 641,597 | ..... |
| Total | 541,597 | 500,000 |
| Deficit | ..... | ..... |
| Surplus | $347,553 | $548,695 |

a Surplus.
b The contingent reserve fund is limited by the contract to $500,000.

## Foreign Tramway Issue Sold in New York Market

Instances are being presented almost daily of the growing participation of United States investors in the work of helping to finance issues of foreign origin. In the past these operations have been confined very largely to government and municipal issues and to the securities of some of the better known steam railroads. On Nov. 10, however, announcement was made that investors at home had bought $1,400,000 of Christiania Tramways Corporation two-year 5 per cent gold notes. The subscription price was 100¼ and interest, to yield about 4¾ per cent. The offering syndicate comprised White, Weld & Company, Blair & Company, Inc., and Brown Brothers & Company, New York.

The Christiania Tramways Corporation was organized on May 1, 1924, as a consolidation of the two privately owned companies. It does all the street railway business in the city, serving a population estimated at 260,000. Fifty-one per cent of the stock of the company is owned by the city, which is the capital and largest city of the Kingdom of Norway. The city unconditionally guarantees the note of the company by indorsement. The note to the bank is in the form of a single instrument. Certificates of participation in the denomination of $1,000 each are to be issued by the National Bank of Commerce, New York, trustee.

## 10.27 Cents per Passenger Is Cost on Staten Island Lines

Transit Commissioner LeRoy T. Harkness has made public the substance of a special investigation made by order of Controller Charles L. Craig of the city of New York which showed that some of Mayor Hylan's municipally operated trolley lines on Staten Island had sustained losses of $57,118 in eighteen months. It was disclosed further that the actual cost of every so-called "5-cent ride" on the routes examined was 10.27 cents.

The Craig report was prepared by R. B. McIntyre, a statistician of the Department of Finance. It states that from Oct. 14, 1921, to March 14, 1923, the total revenue earned by the lines was only $54,171, while the operating and maintenance expenses were $111,289.65.

Commissioner Harkness said that similar losses were now being incurred on the other municipal lines operating on Staten Island, despite the use of policemen to help in the task of loading at the ferry station, the help of trucks belonging to a city department and the aid of labor from other branches of the city government. He said:

> If a strict accounting were kept of what the city actually spends in maintaining these lines, the Department of Plant and Structures would show an appalling financial loss on all.

In commenting upon the assertion that the actual cost of every ride is 10.27 cents, the report says:

> In other words, every passenger paying 5 cents has been riding at the expense of the taxpayers of the City of New York to the additional extent of 5.27 cents.

Despite the excessive cost of operation, Mr. Harkness pointed out, the Staten Island service has been so inefficient and inadequate that residents are demanding the installation of bus routes and extension of a steam railroad. He said:

> The operation of the Staten Island trolleys by the city has been so extremely atrocious that, if it had been the performance of any private company under the jurisdiction of this Transit Commission, it would not have been allowed to continue, by application of the statutes which govern negligent and ineffective operation.
>
> From the standpoints of safety, of service and financing, the attempt of Mayor Hylan to furnish transportation has been a pathetic failure.

Mr. Harkness's statement followed a number of protests by Staten Island commuters, who asserted that they were facing a winter of unheated cars, inadequate in number and running on uncertain schedules.

In confirmation of these protests, Mr. Harkness made public a report by William O. Smith, Transit Commission inspector, to George F. Daggett, chief of the Transit Bureau, which cited instances of overloading on several Staten Island lines, ranging from 102 to 350 per cent.

## New Wisconsin Valuation Policy Attacked

Public utility companies in Wisconsin, through the Wisconsin Utilities Association, are protesting against the Wisconsin Tax Commission's new valuation policy toward them. This policy is on a basis of 100 per cent of the

present value regardless of the percentage used by local assessors in valuing other private property. General property, however, is assessed at 80 per cent, while the properties of gas, electric and electric railway companies will be assessed 100 per cent of their true value. The association brands the new policy as unjust and discriminatory unless it is extended to all property owners.

## Further Progress Reported in St. Louis Reorganization

Argument before the court in the suit of the St. Louis & Suburban Railway bondholders for a separate receivership and foreclosure on that portion of the United Railways set for trial in the United States District Court in St. Louis has been continued until Nov. 15. As a consequence it is freely predicted in St. Louis that an early agreement with the Suburban bondholders will be reached by the reorganization committee of the United Railways.

It is said that only one point remains to be cleared up, the question of the period of extension of the maturity date of the $4,500,000 Suburban bonds. A virtual agreement has been reached on all other points at issue, it is said. It is possible that when the Suburban foreclosure case is again called before Judge Faris announcement will be made that an agreement has been reached covering all the points in dispute.

## San Francisco Municipal Line Using Up Capital

Objection to the practice of the San Francisco Board of Supervisors in using depreciation reserve of the Municipal Railway to finance extensions and betterments, has again been over-ridden, although voiced by the city engineer and leading civic organizations. The Supervisors have adopted a resolution declaring they will appropriate $393,180 out of this depreciation reserve to pay for the city's part in driving another tunnel through the western hills to improve transportation into the so-called Sunset district. The tunnel would be used by the Municipal Railway and be paid for through an assessment district and by the city. An effort to authorize a $400,000 appropriation from the city's general fund has been tabled.

There was $1,184,737 in the depreciation fund in April last. Necessary carhouse and car shop extensions and the building of extensions ordered by supervisors, including trackage which would follow the bore, would convert this balance into a $94,000 deficit, it is estimated. Other necessities and proposals, which seemingly depend upon the same fund, if executed would enlarge that deficit to more than $3,000,000.

Observers of the Municipal Railway believe the city is storing up trouble in failing to maintain an adequate depreciation reserve to insure continued operation of the lines in the future. As one observer put it, on the basis of capital cost of properties and their expected life, the present depreciation reserve balance appears wholly inadequate without further withdrawals.

## Dividend on Savings Association

At a recent meeting of the board of directors of the Savings & Loan Association of the United Railways, St. Louis, Mo., a semi-annual dividend at the rate of 6 per cent per annum payable to stockholders of record on Aug. 31, 1924, was declared. The sum to be disbursed is $71,000. This brings the total dividends paid in the past twelve months to $134,700. A grand total of $487,000 has been paid to members of the association since it was formed nine years ago. The association comprises 5,369 members, employees of the United Railways and their families. It has placed 1,558 members in their homes. At a special meeting of the stockholders on Sept. 16 the authorized capitalization of the association was increased from $8,000,000 to $9,000,000, the second million in authorized capital stock voted this year.

## Schenectady Railway Earnings Improve

News comes from Schenectady, N. Y., that the local railway has turned a 270,000 deficit into a net of $80,000 for the quarter ended Sept. 30, 1924, as compared to the same period of 1923. The figures follow:

| | 1923 | 1924 |
|---|---|---|
| Operating revenues | $119,930 | $389,837 |
| Operating expenses | 390,629 | 309,801 |
| Net revenue | $270,699* | $80,036 |
| Taxes assignable to railway operation | 23,847 | 27,224 |
| Operating income | $294,546* | $52,812 |
| Non-operat. income | 295 | 605 |
| Gross income | $294,250* | $53,417 |
| Total deduction from gross income | 42,707 | 53,226 |
| Net corporate inc. | $336,958* | $191 |

*Signifies loss.

This is the first news indicating that E. M. Walker, president during the past year, is getting under way. The situation in Schenectady is considered one of the worst remaining in the industry. Mr. Walker has had a tremendously difficult task. He is making real headway, but the railway is still a long way from being on a satisfactory basis. What has been accomplished thus far in the way of improved service and better earnings is all the more remarkable in view of the fact that no new money has been put into the property. It seems obvious that further development of the property depends very largely on a program of modernization, which will necessitate new money.

## Valuation Finding at Denver Still Before Court

The outcome of the litigation between the city of Denver and the Denver Tramway is expected to be known before Jan. 1 if present plans do not go amiss. The case is before Judge Robert E. Lewis of the United States Circuit Court of Appeals at St. Louis.

It will be recalled that it was Judge Lewis who named Ernest Stenger receiver for the company and authorized an 8-cent cash fare, the company cutting the amount of fare by selling two tickets for 15 cents.

The principal points to be passed on by Judge Lewis is: What is the proper valuation of the company's properties, and what is a fair return on its investment?

In this connection the city claims that the valuation is about $7,500,000. The company says the value is $30,000,000. Special Master in Chancery Dubbs fixed the valuation at $20,105,707. Judge Dubbs' report cited that 7½ per cent was fair on the $20,105,707 valuation. The city takes exception to the valuation of both Judge Dubbs and the company.

## $1,000,000 Erie Issue Quickly Subscribed

Myron S. Hall & Company, New York, offered on Nov. 11 a new issue of $1,000,000 Erie Railways first and refunding mortgage 6 per cent bonds, due Oct. 1, 1954. The company owns about 67 miles of track serving a population of 128,000 in Erie, Pa. Valuation of the property by the Public Service Commission of Pennsylvania amounts to twice the total funded debt, while strong provisions surround issuance of further bonds under this mortgage. The bankers report an oversubscription to this issue. The bonds were priced at 95 and interest to yield 6⅜ per cent. The present Erie Railways comprises part of the property formerly included in the system of the Buffalo & Lake Erie Traction Company, segregated following foreclosure.

## Power Company After Niagara Gorge Railroad

Application has been made by the Niagara Falls Power Company, Niagara Falls, N. Y., to the Public Service Commission for permission to acquire and hold all or any part of the capital stock of the Niagara Gorge Railroad, operating a scenic belt line in the lower Niagara gorge between Lewiston and Niagara Falls.

The application also asks permission to pledge as security for $1,000,000 of 5 per cent bonds of the Niagara Gorge Railroad an equal amount of 5 per cent bonds of the Niagara Falls Power Company. As its reason for acquiring the stock of the gorge route the application of the power company sets forth that the railroad owns valuable riparian rights along the shore of the gorge for a distance of more than 5 miles; that the Gorge Railroad is the owner of the stock of the Niagara Gorge Power Company, and that the free and paramount use of the railroad is essential in any construction work for hydro-electric development which may be undertaken along the lower Niagara gorge.

Paul A. Schoellkopf, president of the Niagara Falls Power Company, says that the value of the gorge line for scenic purposes is not to be disregarded and no effort will be spared to give the public the opportunity of seeing the lower group from the right-of-way of the electric route.

The Niagara Gorge Railroad is owner of all of the capital stock of Lewiston & Youngstown Frontier Railway, which is operated by the Niagara Gorge Railroad, in conjunction with its own Lewiston-Youngstown line.

## Arbitration Award Delay Helps Financing

According to the Toronto *Globe* the intricacies of finance are illustrated by the issue of $7,900,000 in civic debentures to pay the balance due on the purchase price of the Toronto Railway system. Finance Commissioner Ross figures that, while the appeal to the Privy Council over the original award means that the city will have to pay more for the property than provided by the award, in the long run the city will save money. Had there been no appeal from the award when the majority of the Arbitration Board reported on the price to be paid by the municipality for the railway, the city would have had to issue debentures carrying 6.40 per cent interest. In the meantime money has become cheaper, and money that would have to carry 6.40 per cent early last year can be obtained now for 4½ per cent.

Mr. Ross roughly calculated that the delay of more than a year and a half will save the city about $2,000,000. Supposing the amount of the debentures to be issued in 1923 and now was the same, $7,900,000, the difference between one year's interest at 6.40 per cent and 4½ per cent is more than $156,000. This alone will show that the Finance Commissioner's deduction about a $2,000,000 saving during the full life of the debentures is quite reasonable.

Civic railway system debentures totaling about $1,300,000 issued in 1911-1912 carry 4 per cent. Five issues, amounting to approximately $700,000, issued between 1912 and 1915, carry 4½ per cent, and since then issues of about $32,000,000 have carried 5 or 6 per cent.

Stockholders of the Toronto Railway, Toronto, Ont., the property of which was taken over several years ago by the city subject to arbitration of the purchase price, will meet on Dec. 1 to consider the winding up of the company and if this is decided upon to appoint a liquidator. Transfer books will close on Nov. 28 and if the decision to wind up is taken, all transactions in the shares will cease from the date of the closing of the books. The meeting will take the first step in the distribution of assets.

## $20,000,000 Issue Placed

The first financing undertaken on behalf of the Cities Service Power & Light Company, the newly created $100,000,000 subsidiary of the Cities Service Company, New York, into which all of the latter's public utility properties are to be placed, consists of $20,000,000 of 20-year 6 per cent sinking fund secured gold bonds, offered by a syndicate headed by Dillon, Read & Company, Federal Securities Corporation, and A. B. Leach & Company, New York, at 94½ and interest, to yield about 6½ per cent. The bonds will be specifically secured by pledge of the common stocks of the six most important operating companies in the Cities Service Power & Light Company, viz.: Toledo Traction, Light & Power Company, (owning the Toledo Edison Company), Ohio Public Service Company, Public Service Company of Colorado, Kansas City (Mo.) Gas Company, Wyandotte County Gas Company (Kansas City, Kan.), Empire District Electric Company (southwestern Missouri), and St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo.

## Tax Refund Is Denied to the Philadelphia Rapid Transit

The federal government has refused to refund to the Philadelphia Rapid Transit Company $5,000,000 of income and excess profits taxes, which both the company and the city believes were erroneously paid. City Solicitor Gaffney is disappointed at the ruling and has said he would advise the Mayor to take an appeal to the Commissioner of Internal Revenue. The appeal will be based on the ground that the Government's decision is a discrimination against Philadelphia, inasmuch as in a similar case a decision was given favorable to Kansas City.

The Rapid Transit Company early this year appealed to the committee on appeals and review of the Treasury Department for a refund of $5,000,000 in income and excess profits taxes, paid by the company during and since 1917. The appeal was denied. Later the city decided to intervene in the matter on the ground that a section of the former Federal Revenue Act exempted from taxation any public utility in which a municipality or other political subdivision had an interest, such as the city has in the Philadelphia railway system by reason of the agreement of 1907.

Before the city appealed to the federal authorities it entered into a contract with the P. R. T. Company, whereby it was provided that if the $5,000,000 were recovered it should be used by the company for making improvements. The case was argued last August.

The recommendation made by the solicitor to the commissioner follows:

> With the exception of one point, the arguments of the City Solicitor merely reiterate with emphasis those presented by the Rapid Transit Company before the committee. Reference is made to the recommendation for a detailed statement of the facts and contentions. These have been again carefully considered, and this office remains unconvinced that error was committed in deciding that the agreement entered into between the Rapid Transit Company and the city was not such as under Section 11 (b) of the act of 1916, as amended by the act of Oct. 3, 1917, would entitle the corporation to exemption from federal income and excess profits taxes.
>
> The validity of the ordinance and contract may be questioned, for it hardly seems probable that a city would be empowered to act as a collecting agent for a corporation even though it was to receive the total amount collected, and there appears to be no other consideration for the contract, but in any event a sufficient answer to any argument founded upon them is found in the words of the proviso of Section 11 (b):
>
> "... whenever any State ... or political subdivision of a State ... has prior to the passage of this title entered in good faith into a contract ... the object of which is to acquire a public utility, no tax shall be levied.
>
> Certainly the tax status of the Transit Company, under the act cited, cannot be affected by a contract entered into in 1924, even though it be in modification of a contract executed in 1907.
>
> It is, therefore, recommended that the protest of the city of Philadelphia, intervening on behalf of the Philadelphia Rapid Transit Company, be denied.

The case was argued orally in behalf of the city before the solicitor on Aug. 7.

## Receiver Appointed for Michigan Railroad

The United States District Court for the eastern district of Michigan, Southern Division, Judge Charles C. Sumon presiding, has appointed John F. Collins, Jackson, receiver of the Michigan Railroad. He has been authorized to continue the operation of the railway lines under the direction of the court.

The receiver was appointed on the application of the Union Railway, Gas & Electric Company of New Jersey, owner of all the stock of the Michigan Railroad, excepting directors' qualifying shares, a general creditor of the company to the amount of $1,465,903, for moneys loaned and the holder and owner of $4,000,000 of the company's general mortgage bonds. The company's property is also subject to a first mortgage of $4,050,000, which it was thought could be extended.

The bill of complaint shows that the offer of the company to extend its $4,050,000 of first mortgage bonds, which matured on May 1, 1924, could not be effected because earnings have decreased to such an extent that the company cannot pay the interest.

The Michigan Railroad consists of the high-speed third-rail line operated between Kalamazoo and Grand Rapids, between Allegan and Battle Creek, and a line connecting Bay City, Saginaw and Flint, covering a trackage of 148 miles.

Holders of more than 85 per cent of the face value of the bonds agreed to an extension of the maturity date, but some of the minority threatened suit to collect. In order equally to protect all the holders the receivership action was started.

## Modification Sought for Plan of Abandonment

An unusual situation was created recently by the announcement that the Visalia Electric Railroad, Exeter, Cal., had asked permission to continue a mail and express special car to handle mail and express business which, in the request for abandonment of passenger service, it had been assumed was to be dropped. The Visalia line is 54 miles.

The Al Askin Stage Line has been granted a permit to operate between Visalia, Woodlake, Lemon Cove and Exeter, replacing the service of the Visalia Electric Railroad, but Manager E. L. Askin stated that company will not begin operations until there is something definite done about mail and express business. It is on this traffic that the stage line bases its hope for some remuneration.

**Another Issue Offered to Employees.**—Subscriptions will be received by the Dominion Power & Transmission Company, which controls more than 100 miles of electric railway and supplies light and power to cities of Hamilton, St. Catharines and Brantford, Ontario, for 2,500 shares of 7 per cent cumulative preferred stock. Shareholders and employees will be first to receive opportunity to subscribe, after which a public offering will be made.

**Will Redeem Outstanding Bonds.**—The Public Service Corporation of New Jersey has elected to redeem on Dec. 1, at 107½ and interest, all its outstanding 20-year secured 7 per cent gold bonds due Dec. 1, 1941. Holders of the bonds are required to present and surrender them with all unmatured coupons attached for redemption and payment on Dec. 1, 1924.

**Statistics on New Orleans.**—Commissioner Paul H. Maloney of the Department of Public Utilities of New Orleans, La., has given out some interesting figures on the public utilities of that city, based upon the report of the New Orleans Public Service, Inc., recently submitted to him for the year ended Sept. 30. According to Mr. Maloney, the citizens ride the cars 106,673,420 times in a year and use 35,654,436 transfers. The total money invested in utilities in the city of New Orleans is $74,866,386. During a year New Orleans, not including Algiers, pays $7,517,091 for electric railway fares.

**Traffic Decreases in St. Louis.**—The report of the United Railways, St. Louis, Mo., for the quarter ended Sept. 30 shows a drop of about 4,000,000 passengers for the period compared with the same months in 1923. The total passengers carried in the quarter this year was 63,282,885, against 57,859,171 in the same period of 1923. For the quarter ended June 30 a decrease of 3,856,112 passengers was experienced, making the loss for the past six months more than 8,000,000 compared with the same months in 1923.

**Charter Amended for Additional Stock Issue.**—Complying with a permit granted recently by the Public Service Commission, the Georgia Railway & Power Company, Atlanta, Ga., will amend its charter so as to issue $2,500,000 of additional 7 per cent cumulative preferred stock. The stock will be redeemable at any time after Jan. 1, 1938, at $115 a share. The present increase will give the Georgia company $15,000,000 in common stock, $10,000,000 in second preferred stock and $6,400,000 in first preferred, making a total capitalization of $31,400,000.

**Arkansas Central Stock to Be Offered.**—Offering has just been made of 5,000 shares of Arkansas Central Power Company cumulative preferred stock by W. C. Langley & Company, New York, and the Old Colony Trust Company. The stock will be priced at $98 a share to yield 7.14 per cent. The company is the successor to the Little Rock Railway & Electric Company.

**Deficit in Net Income.**—The Boston Elevated Railway, Boston, Mass., in a return filed with the Massachusetts Department of Public Utilities reveals a deficit in its net income of $786,099 for the nine months ended Sept. 30. An increase in operating expenses and fixed charges is given as the reason. The report shows an increase in passengers carried for the nine months of 4,255,663 over a similar period in 1923, which, however, was not sufficient to offset increased operating expenses and fixed charges. Passengers carried in the nine months totaled 281,088,673 and for the same period this year 285,344,336. The first nine months of 1924, compared with the same period in 1923, shows a loss of $650,004 in operating income and $20,570 in non-operating income. The gross income for the nine months of 1924 was $5,212,357, against $5,882,923 for 1923.

**Duluth-Superior Earnings Off.**—Net income of the Duluth-Superior Traction Company, Duluth, Minn., for the third quarter of 1924 amounted to $10,061. This is a decrease of 73.84 per cent compared with the net income of $38,453 for the corresponding period of last year. Gross revenues for the quarter were $429,237, a decrease of 8.59 per cent. Operating expenses were $349,393. This is 1.88 per cent below the record for the corresponding period of last year. Net revenue was $79,844. This is a decrease of 29.63 per cent. Fixed charges and taxes were $69,782, a decrease of 6.97 per cent. For the nine months ended with September net income stood at $17,510, which compares with $124,873 for the first nine months of last year.

**Algiers Properties Sold.**—The liquidators of the Home Bank of Canada have, with the approval of the court and of the inspectors appointed to represent creditors, sold the interests of tne bank in the West New Orleans Light & Traction Company and the South New Orleans Light & Traction Company, Algiers, La., to E. W. Burgis, of New Orleans, president and general manager of the companies, for the sum of $800,000 cash. The outlays of the Home Bank of Canada in connection with the railway and light enterprises amounted, with unpaid interest, to approximately $1,150,000 at the date of suspension of the bank.

**Additional Offering of Debenture Bonds.**—Bonbright & Company, New York, announce an additional offering of $5,000,000 of the American Power & Light Company's gold debenture bonds. The bonds are dated March 1, 1916, and are due March 1, 2016. The price is 94½ and accrued interest, to yield 6.35 per cent. The American Power & Light Company owns practically all the common stocks of companies supplying directly or indirectly 397 communities. The territory served included many important cities such as Portland, Ore.; Wichita, Council Bluffs, Duluth and other cities.

**Traffic Decreases.**—According to the report submitted to the Public Service Commission, approximately 40,000 fewer fares were collected during September on the lines of the United Railways & Electric Company, Baltimore, Md., than in August. There were also 1,480,158 fewer passengers in September of this year than in September a year ago. For June, July, August and September of the current year 71,890,389 passengers rode the cars, compared with 78,724,396 in the same four months in 1923.

**Deficit for Interborough.**—The total revenue of the Interborough Rapid Transit Company, New York, N. Y., for the three months ended Sept. 30, 1924, were $13,279,939, an increase of $445,607 over the similar three months of the year previous. The operating expenses, taxes and rentals paid the city for the old subway amounted to $9,201,167, a decrease of $281,153. The income available for all purposes was $3,672,858, an increase of $1,166,589 over the three months ended Sept. 30, 1923. After providing for actual maintenance there was a deficit of $923,184 for the three months period ended Sept. 30, 1924. This figure represents an increase of $936,854 over the balance for the similar three months period ended Sept. 30 a year ago.

**Earnings Increase.**—According to preliminary figures of the September gross earnings of the Indianapolis Street Railway, Indianapolis, Ind., an increase of 5.48 per cent is shown over gross earnings of September, 1923, while there is an increase of almost 2 per cent over the August earnings of this year. In round figures, there was an increase of $16,000 in earnings over September, 1923, and a gain of $10,000 over last August's receipts. Although the present rate of earnings is not so great as was expected when the company was granted an increase in fares last May, last month's record was by far the most satisfactory, as viewed from the company's standpoint, since the increase in fares became effective.

**Municipal Line at Calgary Hard Hit.**—The Canadian *Financial Post* says that continued deficits in the operation of the Calgary Municipal Railway, Calgary, Alberta, due to the marked falling off in passenger traffic, is the biggest problem facing Calgary. Administration and overhead expenditures have been reduced almost to a minimum, and the commissioners are now endeavoring to work out some system that will improve the situation. The introduction of buses in some sections is receiving serious consideration. The operation of street cars in the outlying districts of the city, where the passenger traffic is not sufficient to pay for the service, is largely responsible for the present condition.

**Power Company Seeks to Purchase Railroad.**—The Niagara, Lockport & Ontario Power Company is seeking authority from the Public Service Commission to purchase all of the outstanding capital stock of the Warren & Jamestown Street Railway, which runs between the borough of Warren, Warren County, Pa., and the city of Jamestown, N. Y. The stock is owned by the Venango Public Service Corporation of Pennsylvania. The prospective purchaser says it could furnish motive power to the railroad either directly or through its subsidiary, the Western New York Electric Company, and could effect economies by using existing transmission lines of the railroad for the distribution of electricity for light, heat and power.

**Earnings Decrease.**—The gross earnings of the railway department of the Cumberland County Power & Light Company, Portland, Me., for the first nine months of the present year showed a decrease of $92,291 over the same nine months in 1923. The operating expenses were $915,613, while for the first nine months of 1923 they were $982,565. This decrease was brought about largely through the reduction of schedules and limitation of shop crews. With interest, rentals and taxes taken into consideration, the department's deficit for the first nine months of this year was $26,331.

# Personal Items

## Lieut.-Col. J. E. Hutcheson Made Vice-President at Montreal

Lieut.-Col. J. E. Hutcheson, general manager Montreal Tramway and its predecessor, Montreal Street Railway, since 1912, has in addition to that office been elected vice-president of the company. From 1891 to 1912 Col. Hutcheson served with the Ottawa Electric Railway. At the time he joined that company the road was under construction. He served with it in various capacities, finally becoming superintendent. It was this post that he was filling when overtures were made to him from the Montreal company. Mr. Hutcheson entered railroad work in 1876 with the Grand Trunk Railroad as a telegraph operator. In 1884 he became connected with the Canadian Pacific Railroad at Ottawa as train dispatcher. Later he was made trainmaster of the company and continued in that capacity until 1891. He then went to Ottawa. Mr. Hutcheson was born in Brockville, Ont., on Sept. 15, 1858.

---

**B. W. Roberts** has been appointed purchasing agent of the Southern New York Railway, Hartwich, N. Y., succeeding Mrs. A. B. Brockway, resigned.

**George Tracey** has been promoted by the Southern New York Railway, Hartwich, to be superintendent in charge of transportation.

**Sir Ernest Clark**, Permanent Secretary of Ministry of Finance, and head of the Civil Service of Northern Ireland, will, at the invitation of Lord Ashfield, chairman of the London Underground Railways, join the staff of that group of companies. He is to be attached to the financial side of the undertakings. Sir Ernest has held various important colonial and Irish financial positions with great success.

**C. G. Britton** has recently been appointed superintendent of the Auburn & Syracuse Electric Railroad, Auburn, N. Y., operating 65 miles of city and interurban railway under the management of Peck, Shannahan & Cherry, Inc. Mr. Britton's first work was in 1903 as a commercial telegrapher. He held various positions in this capacity until 1904. He then entered the railroad field as station operator and later became a train dispatcher on a branch of the Pennsylvania Railroad. In 1906 he became connected with the Annapolis Short Line Railroad, holding positions as train dispatcher, trainmaster and superintendent of transportation until 1921. That year the road was merged with the Washington, Baltimore & Annapolis Electric Railroad, after which he engaged in other business until 1922, when he accepted a position with the Chesapeake Beach Railway as chief dispatcher. He remained with this company until he accepted his present position with the Auburn & Syracuse Electric Railroad.

**Samuel A. Wallace**, formerly with the London General Omnibus Company, London, England, will be in charge of the new plant of the Public Service Transportation Company at Irvington, N. J., purchased this year for use as a bus maintenance shop where major repairs will be made. The transportation company is the bus operating subsidiary of the Public Service Railway, Newark.

**Clark Verner Wood, Jr.**, is now superintendent of the bus division of the United Electric Railways, Providence, R. I. He has been with the Providence company since March, 1923, in the capacity of assistant to R. R. Anderson, superintendent of transportation. Mr. Wood is the son of Clark V. Wood, president of the Worcester Consolidated Street Railway and the Springfield Street Railway in Massachusetts. Previous to his work with the United Electric Railways, he was for several years in charge of the power-saving departments of the Worcester and the Springfield companies. A brief outline of Mr. Wood's activities appeared in the ELECTRIC RAILWAY JOURNAL, March 24, 1923.

**Vincent E. Keenan**, superintendent of the bus department, United Electric Railways, Providence, R. I., has left the employ of that company to take charge of the mechanical department of the bus division of the Public Service Railway, Newark, N. J. Mr. Keenan has been connected with the United Electric Railways since April, 1923. For the preceding three years he was on the staff of the Fifth Avenue Coach Company, New York, in the capacity of research engineer, and previous to that time he was in charge of the experimental department of the Locomobile Company of America at Bridgeport, Conn. He was educated at Clason Point Military Academy, Westchester, N. Y., and Cornell University.

**Charles W. Ford** has resigned as general superintendent of the Kansas City, Clay County & St. Joseph Railway to become district representative of the Yellow Coach Manufacturing Company, with headquarters in Kansas City, Mo. His resignation becomes effective Dec. 1. Mr. Ford has had an experience of 25 years as general superintendent in charge of mechanical and operating details of both transportation and electrical properties. He has been with the Clay County electric line the last 10 years. He is president of the Mid-west Electric Railway Association.

**R. S. Mahan**, claim and general passenger agent of the Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo., has been appointed general superintendent of the company to succeed Charles W. Ford, who has become connected with the Yellow Coach Manufacturing Company. Mr. Mahan has been conected with the railway in an official capacity ever since the company was organized.

# Obituary

## Dr. Walter Boveri

**President of Noted Swiss Manufacturing Concern—Economist and Organizer of Electric Industry**

Dr. Walter Boveri, president of the famous firm of Brown, Boveri & Company, died at his home at Baden, Switzerland, on Oct. 28. The immediate cause of his death was a heart lesion which he suffered in September. Doctor Boveri had actually never recovered from an automobile accident which he met with in August, 1922.

Doctor Boveri was a man of charming personality and one who never knew what it was to be confounded by any obstacle. He had many friends in the United States as well as in all the countries of Europe. He was an honorary citizen of the town of Baden and a member of many electrical and scientific societies.

Doctor Boveri acted as president of Brown, Boveri & Company from the inception of the company to his death. He was never a designing engineer. He was best known as an organizer and was a deep student of economics, but he did play a very important part in the development of the mercury-vapor rectifier as applied to electric railways, both tramway and trunk line, now coming into fairly wide use in Germany. He was primarily responsible for the creation of the associated companies with factories at various places in the eight countries and with affiliated sales agencies in virtually every country in the world.



Dr. Walter Boveri

Walter Boveri was born in Bamberg, Bavaria, in 1865, of Italian-Swiss parentage. He attended the industrial school at Nürnberg and after completing his studies there entered the services of the Oerlikon Machine Works, where he was chiefly in charge of installation work. In 1890 he left the Oerlikon works and with the elder Charles Brown, who was chief designer at Oerlikon, started the plant at Baden, which has since developed to be one of the best-known electrical manufacturing concerns in the world. The firm was founded as a purely electrical manufacturing concern with the modest

capital of about $120,000. As early as 1892 it added mechanical products to its line.

In 1916 the Federal Technical High School of Zürich bestowed a diploma conferring the degree of doctor of engineering science upon Mr. Boveri "in acknowledgment of his great merits in the development of electricity in general and the Swiss electrical industry in particular."

---

**Henry Procter Waugh**, well known in newspaper life in New York for 20 years, died, on Nov. 12, after an operation for cancer of the throat. For many years Mr. Waugh had been publicity director of the Interborough Rapid Transit Company and editor of both the *Interborough Bulletin* and the *New York Railways Magazine*, published in the interest of the employees of those companies. He came to New York 25 years ago from the South, where he had worked on his home town paper in Morristown, Tenn. His newspaper experience also included a period on the *Courier-Journal*. Starting in New York as a reporter on the *World*, he remained with that paper for 12 years, finally becoming assistant city editor. He went with the Interborough in March, 1909. He was 50 years of age.

# Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

## Public Service Will Buy 100 New Buses

The intention of the Public Service Transportation Company, a subsidiary of Public Service Railway, to purchase 100 new buses has just been announced by officials of the company. Conferences have been held between M. R. Boylan, vice-president and general manager of the railway, and representatives of various bus makers. Specifications for the new buses have not yet been made public, but it is understood that the railway wishes to include certain special features in the design. Quick delivery is very much desired.

Tentative permission to proceed with plans to buy the new buses has been given to the operating officials of the railway by Thomas N. McCarter, president. Final approval of the move is expected to be given at the next meeting of the board of directors of the corporation.

The large scale operations of the company in the purchase of existing buses during recent months have placed it in possession of many vehicles of antiquated design. It is the desire to replace these by modern buses at the earliest possible moment. Pending the deliveries of those now being negotiated for, the railway is making efforts to borrow buses from other cities.

## New Company to Finance Bus Purchases

The directors of White Motor Company have organized White Motor Securities Corporation to increase facilities for financing time sales of White trucks and buses. The new company will have an authorized capital of $5,000,000. Walter C. White, president of White Motor Company, said heretofore the White Company had financed all of its customers' paper through its own resources without any rediscounting. However, the large increase in purchases by railroads and other transportation as well as a general increase in time sales makes it advisable for White Motor Company to anticipate requirements for additional facilities for financing such sales without impairing working capital. The new company will provide such facilities at the lowest possible cost to customers and will enable the company to take advantage of desirable business.

## New York Railways Awards Oil Contract

An important electric railway lubricating contract was closed Nov. 8 when the business of supplying oil for the entire lubricating requirements of the New York Railways was awarded to the Texas Company.

The New York Railways operates 1,593 motor passenger cars over 72.43 miles of route in Greater New York. The contract with the Texas Company does not include oil for use in power stations as the railway purchases its energy from the Interborough Rapid Transit Company. The contract became effective on Nov. 1.

## Bids Asked for New Carhouse at Grand Rapids

The Grand Rapids Railway, Grand Rapids, Mich., will rebuild the carhouse destroyed by fire on July 19, 1924, under plans by Williams, Crow & Proctor, Grand Rapids architects. When estimates have been obtained the company will be prepared to proceed with construction.

The new building will consist of two units. One, 16 ft. by 30 ft., will be an office building with two stories and basement. It will have a general office and cashier's office on the first floor, foreman's office and men's quarters on the second and a heating plant in the basement.

The other unit will include the car inspection shop and car washroom, with boiler room and a substation, the larger building being 38 ft. by 224 ft. and the substation 16 ft. by 65 ft. The present substation, 22 ft. by 33 ft., will be used for storage of sand and salt. The car inspection building will cover three tracks. Cars not in need of attention will be stored in the open.

The car inspection building will be one story and of brick construction like the other buildings now in use. It will include space for storage, heating plant, coal for the cars, oils and tool room.

## Formation of a Court of Commerce Suggested

Bernard M. Baruch, former head of the War Industries Board, reviewing business conditions and their relationship to government, has suggested the formation of a Court of Commerce, which would decide for business men important questions that might confront them. This court, he said, would differ from the Federal Trade Commission, which he termed an "inquisitorial body," and would appeal to the business man as the Supreme Court does to the lawyer. Mr. Baruch made his suggestion at the Waldorf-Astoria at the fifth annual luncheon reunion of the former members of the War Industries Board.

He said that the country must soon determine what to do with great aggregations of capital. By encouraging them will it be made more difficult for individuals to start a business and cause them to enter the service of these great corporations in order to make a livelihood and career for themselves? He said in part:

> What shall be the attitude of government toward business? During the war we built up great combinations of industry, some of which have remained in the form of associations. These are capable of great good and possibly great harm. A grave question is. Shall the Sherman anti-trust law prevent such great combinations and associations, or shall business be permitted to combine for better production and distribution, thereby cheapening both and resulting in lower prices for the consumer: and if they are permitted to function, what regulatory or supervisory power should be exercised? These combinations, by their mass production, increase the standard of living by placing in the hands of the greatest number of people many of the things which they need.
>
> One of the ideas that we discussed among ourselves was the establishment of a Court of Commerce, before which business men would come with such questions as whether in time of overproduction and low prices they could cut down production and fix a price. If it were possible to establish such a court to say what could and what could not be done, instead of an inquisitorial body like the Federal Trade Commission, would it not appeal as much to the business man as the Supreme Court to the lawyer? Broadly, this court would encourage such practices of co-operation and co-ordination in industry as would be found to be clearly of public benefit, but it should watch against abuses.

## Metal, Coal and Material Prices

| Metals—New York | Nov. 11, 1924 |
|---|---|
| Copper, electrolytic, cents per lb. | 13.625 |
| Copper wire base, cents per lb. | 16.25 |
| Lead, cents per lb. | 8.65 |
| Zinc, cents per lb. | 6.762 |
| Tin, Straits, cents per lb. | 54.375 |
| **Bituminous Coal f.o.b. Mines** | |
| Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons | $4.325 |
| Somerset mine run, Boston, net tons | 2.175 |
| Pittsburgh mine run, Pittsburgh, net tons | 1.875 |
| Franklin, Ill., screenings, Chicago, net tons | 1.375 |
| Central, Ill., screenings, Chicago, net tons | 1.275 |
| Kansas screenings, Kansas City, net tons | 2.00 |
| **Materials** | |
| Rubber-covered wire, N. Y., No. 14, per 1,000 ft. | $5.25 |
| Weatherproof wire base, N. Y., cents per lb. | 17.75 |
| Cement, Chicago net prices, without bags | 2.20 |
| Linseed oil (5-lb. lots), N. Y., per gal. | 1.14 |
| White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots | 0.152 |
| Turpentine (bbl. lots), N. Y., per gal. | 0.875 |

## Rolling Stock

**Brooklyn City Railroad** will probably place the order for its new cars, which has previously been referred to in this paper, some time during the week ended Nov. 22. The order will comprise 335 new double-truck four-motor cars very similar in type to the 250 purchased last year. This order will call for an expenditure of more than $5,000,000.

**Illinois Central Railroad, Chicago, Ill.,** it was reported on Nov. 10 was holding up temporarily the matter of the awards for the 250 new multiple-unit cars to be supplied to it for use in its terminal electrification project, but the opinion was expressed that the delay was a matter of only a few days. Specifications for the new cars were sent out early in September. Meanwhile, of course, announcement is delayed with respect to the probable award of contracts for the electrical equipment.

**New York, Westchester & Boston Railway, New York,** expects that the first of its 10 new all steel cars will be delivered at the Van Nest Shops about Nov. 18. The cars were built by the Pressed Steel Car Company and the first shipment was made on Nov. 5. The new car is 72 ft. 7¼ in. long, weighs 120,000 lb. and has a seating capacity of 80. The cars are equipped for multiple-unit operation at high speed. Dimensions and details of the equipment follow:

| | |
|---|---|
| Type of car | Vestibuled Passenger |
| Weight: | |
| Car body | 77,500 lb. |
| Motor truck | 16,620 lb. |
| Trailer truck | 12,580 lb. |
| Equipment | 13,300 lb. |
| Total | 120,000 lb. |
| Bolster centers, length | 47 ft. 7½ in. |
| Length over all | 72 ft. 7¼ in. |
| Truck wheelbase | 8 ft. 0 in. |
| Width over all | 10 ft. 4 in. |
| Height, rail to trolley base | 14 ft., 5 in. |
| Body | All steel |
| Interior trim | Agasote |
| Headlining | Agasote |
| Roof | Arch |
| Air brakes | Westinghouse |
| Armature bearings | Bronze |
| Axles | Standard Steel Works |
| Buffers | Pullman |
| Car signal system | Westinghouse conductor's whistle |
| Car trimmings | James L. Howard & Co. |
| Center and side bearings | Perry |
| Conduits and junction boxes | Westinghouse |
| Control | Westinghouse |
| Curtain fixtures | Morton Manufacturing Co. |
| Curtain material | Fabrikoid |
| Destination signs | Ellcon |
| Door-operating mechanism | National Pneumatic |
| Draft gear | Pitt-Forsyth |
| Gears and pinions | Nuttall BP pinion and flexible gear |
| Hand brakes | Blackall |
| Heater equipment | Gold |
| Headlights | Golden Glow |
| Journal bearings | Bronze |
| Journal boxes | Symington—5½ in. x 10 in. |
| Motors | Westinghouse 409-B, inside hung |
| Paint | Veluvine enamel |
| Sash fixtures | O. M. Edwards |
| Seats | Heywood-Wakefield |
| Seating material | Pantasote |
| Slack adjuster | Westinghouse Type L |
| Springs | Semi-elliptic |
| Step treads | Kass safety |
| Pantograph | Nuttall U. S. No. 131 |
| Pantograph shoe | No. 14 gage steel |
| Trucks | Pressed Steel Car Company |
| Ventilators | Garland |
| Wheels: | |
| Motor truck | 42-in. steel tired |
| Trailer truck | 36-in. rolled steel |

**Grand Rapids Railway, Grand Rapids, Mich.,** plans to conduct a comparative test this winter of light-weight noiseless electric street cars, St. Louis and Brill cars. Last July the company lost 65 cars by fire, and since then has been reported to be in the market for 30 cars of the one-man, two-man type.

**South Carolina Gas & Electric Company, Spartanburg, S. C.,** has received the first of the four new buses recently ordered by it for operation in the city supplementary to the street car lines. The vehicle has a seating capacity of 22 persons. It is of Dodge-Graham make. Three more vehicles of the same size and type are expected soon.

## Track and Line

**Spokane United Railways, Spokane, Wash.,** has been doing repair work on Sprague Avenue and on the Rockwood line. New ties have been put in, curves have been rebuilt and broken rails cut out. At Hamilton and Baldwin Streets new frogs have been installed and the track structure has been rebuilt.

**Milwaukee Electric Railway & Light Company, Milwaukee, Wis.,** has completed the construction of the eight-block extension of the Center Street line bridging the gap between Twenty-seventh Street and Thirty-fifth Street. The extension required an expenditure of approximately $100,000. It covers 2,700 ft. of trackage, 2,440 ft. of double track and 260 ft. of single track, the latter to be double tracked when grade crossing improvements are under way by the railroad which crosses this line.

**Key System Transit Company, Oakland, Cal.,** has started reconstructing track and laying permanent pavement on West Twelfth Street at a cost of $103,000. The extension of the Lakeshore line on Walla Vista Avenue a distance of 1,787 ft. east will cost $25,000.

**Stockton Electric Railroad, Stockton, Cal.,** will build a half mile double track extension to the College of the Pacific. General Manager Webster has secured an appropriation of $40,000 for the extension and work will start as soon as rights of way are secured and the franchise granted by the City Council.

**Coral Gables Utilities Company, Miami, Fla.,** has been granted a 25-year franchise to build and operate a railway. Work on the new line, which will be approximately 3½ miles long, is to be started immediately. The estimated cost is $150,000. The downtown and city portion of the line will operate over municipal tracks and over tracks owned by the Coral Gables Utilities Company for the remainder of the distance. It is said that an arrangement has been made with the Florida Power & Light Company, lessee of the municipal traction line for using the tracks and furnishing power.

**Dallas Railway, Dallas, Tex.,** celebrated recently the opening of the Southwest Oak Cliff route and the completion of the Hampton Place car line, an extension of about 2 miles from Tyler Street and Jefferson Avenue in Dallas, Tex. The extension has been completed at a cost of $136,000, a portion of which was borne by the Dallas Railway and the remainder by the Moss-Tate Investment Company.

## Trade Notes

**Heine Boiler Company, Inc., St. Louis, Mo.,** announces that R. C. Broach, formerly in the general sales department at St. Louis, has been appointed its southeastern district manager, with offices in the Glenn Building, Atlanta, Ga. S. B. Alexander will continue as special representative in North and South Carolina.

**Gibb Instrument Company, Bay City, Mich.,** manufacturers of electric welding and electric heating equipment, announces the appointment of H. V. Beronius to represent it in Iowa, Kansas, Nebraska, Oklahoma and northwestern Missouri. His headquarters will be 33 Linwood Terrace, Kansas City, Mo.

**Fuller-Lehigh Company, New York, N. Y.,** has entered into an agreement with Babcock & Wilcox, Ltd., of London, to operate under the Fuller-Lehigh Company patents, whereby everything in connection with its pulverized coal business will be handled in the various countries throughout the world by Babcock & Wilcox, Ltd., of London, with the exception of the United States, its dependencies, Canada and Mexico. Babcock & Wilcox, Ltd., has taken over a large number of the members of the Fuller organization who have specialized for years in work of this kind.

**Globe Electric Supply Company, Denver, Col.,** has been appointed district representative for the Kuhlman Electric Company of Bay City, Mich. The territory involved includes the states of Wyoming, Colorado and New Mexico. The Kuhlman company expects to have a stock of transformers placed shortly with this new representative.

**Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.,** will complete about Dec. 1 the $2,000,000 annex to its plant at Lester, Pa. The new plant, now partly in operation, is known as the turbine blading shop. Work upon the structure was begun last spring. Two buildings of steel, hollow tile and concrete and covering more than a city block are included in the new unit.

## New Advertising Literature

**Rail Welding & Bonding Company, Cleveland, Ohio,** has issued Bulletin No. 112, covering Una Rod 300. The bulletin states "Una Rod 300 welds as easily as a low carbon steel and deposits a pad of clean high carbon metal as hard as the rail."

**Triumph Electric Company, Cincinnati, Ohio,** has issued a bulletin on the TR self-start motor.

**Walter A. Zelnicker Supply Company, St. Louis, Mo.,** has issued Bulletin No. 329, listing information on locomotive equipment, rail material and power plant and contractors' machinery.

**General Electric Company, Schenectady, N. Y.,** has issued a 27-page bulletin, designated as No. 47731, on automatic station control equipment. It describes briefly the uses and advantages of this type of equipment and is well illustrated.

*Here's the test!*



# Try this on your cars!

**Slack off the brake shoes until full piston travel is required to set brake.**

**Release air brakes.**

**Then try to set hand brake!**

**Will it hold?**

That's the test which proves the point. Unless the hand brake holds when the piston travel exceeds say 5½ inches, it's useless to struggle with it. Yet there are thousands of cars operating every day the brakes of which cannot meet this simple test of safety. Are any of your cars like this?

## PEACOCK STAFFLESS BRAKES will always pass this safety test—

Their unequalled facility for winding in almost any length of chain enables Peacock Staffless Brakes to overcome any condition of excessive piston travel, slack brake shoes or the like, and actually make a powerful brake application. This is a guarantee of safety which you cannot afford to overlook.



**National Brake Co., Inc.**

890 Ellicott Sq., Buffalo, N. Y.

*Canadian Representatives:*

Lyman Tube & Supply Company, Limited. Montreal. Canada

# Bankers and Engineers


**Ford, Bacon & Davis**
Incorporated
**Engineers**
115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

**The J. G. White Engineering Corporation**
Engineers—Constructors
Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads
43 Exchange Place New York

**STONE & WEBSTER**
Incorporated
EXAMINATIONS REPORTS APPRAISALS
ON
INDUSTRIAL AND PUBLIC SERVICE PROPERTIES
NEW YORK BOSTON CHICAGO

**JOHN A. BEELER**
Operating, Traction and Traffic Investigations
Routing Surveys—Valuations—Operation
Management
52 Vanderbilt Ave., NEW YORK

**SANDERSON & PORTER**
ENGINEERS
REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS
RAILWAY, LIGHT and POWER PROPERTIES
CHICAGO NEW YORK SAN FRANCISCO

**ENGELHARDT W. HOLST**
*Consulting Engineer*
Appraisals, Reports, Rates, Service Investigation, Studies on Financial and Physical Rehabilitation Reorganization, Operation, Management
683 Atlantic Ave., Boston, Mass.

**ALBERT S. RICHEY**
ELECTRIC RAILWAY ENGINEER
WORCESTER, MASSACHUSETTS
REPORTS - APPRAISALS - RATES - OPERATION - SERVICE

**WALTER JACKSON**
*Consultant on* Fares and Motor Buses
Originator of unlimited ride, transferable weekly pass. Campaigns handled to make it a success.
143 Crary Ave., Mt. Vernon, N. Y.

**Byllesby Engineering & Management Corporation**
208 S. La Salle Street, Chicago
New York Tacoma

**DAY & ZIMMERMANN, INC.**
ENGINEERS
DESIGN - CONSTRUCTION - REPORTS
VALUATIONS - MANAGEMENT
NEW YORK PHILADELPHIA CHICAGO

**STEVENS & WOOD, INC.**
Design and Construction of Power Stations
Railroad Electrification, Industrial Plants
REPORTS AND APPRAISALS
*Management and Financing of Utilities and Industrials*
Mahoning Bank Bldg. Youngstown, O.
120 Broadway New York

**JAMES E. ALLISON & CO.**
Consulting Engineers
Specializing in Utility Rate Cases and Reports to Bankers and Investors
1017 Olive St., St. Louis, Mo.

**HEMPHILL & WELLS**
CONSULTING ENGINEERS
Gardner F. Wells Albert W. Hemphill
*APPRAISALS*
INVESTIGATIONS COVERING
Reorganization Management Operation Construction
43 Cedar Street, New York City

**HUMAN ENGINEERING**
*Railway Audit and Inspection Company, Inc.*
*Fourth and Chestnut Sts., Philadelphia*
Boston New Orleans New York Pittsburgh BRANCHES Baltimore Chicago Atlanta St. Louis

**Dwight P. Robinson & Company**
Incorporated
Design and Construction of
*Electric Railways, Shops, Power Stations*
125 East 46th Street, New York
Chicago Youngstown Atlanta Philadelphia
Los Angeles Montreal Rio de Janeiro

The Most Successful Men in the Electric Railway Industry read the
ELECTRIC RAILWAY JOURNAL
Every Week

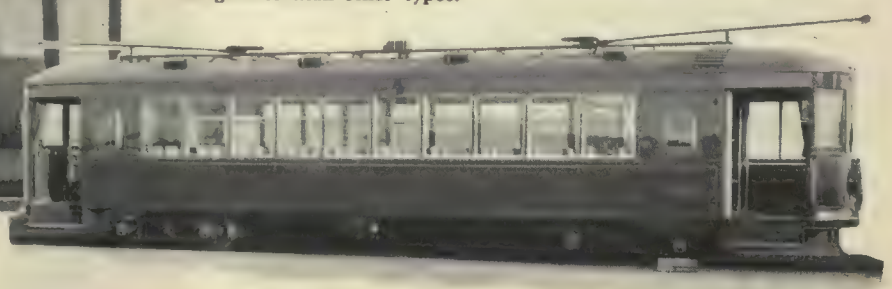
# HASKELITE and PLYMETL

## *Have Revolutionized Car Building*

### A new and better type of car is now available at less cost



These two engineering materials have taken first place with some of the leading car builders in the country. Car roofs of HASKELITE are many times stronger and lighter than any other type. They are made in sections and by their use no headlinings are necessary. PLYMETL panels are stronger, lighter and more resilient than steel and their insulation value is so great that no inner side linings are required. Reduction in weight made possible by using HASKELITE and PLYMETL on a double truck car results in an annual saving in operating costs of over fifty dollars. Yet the first cost of such a car is no greater than other types.



The new cars built by J. G. Brill Co. for the York Railways, operated by Day & Zimmermann, Inc., are typical of what is possible through the use of these superior materials. Note the absence of headlinings and waistlinings, the handsome exterior and interior. The big improvement in operating and maintenance costs cannot be shown in photographs, it must be experienced to be appreciated. Blue print booklet and samples sent upon request.

*Send for full engineering information*

HASKELITE MANUFACTURING CORPORATION
133 W. WASHINGTON STREET, CHICAGO, ILL.

---

**JOE R. ONG**
**Consulting Transportation Engineer**
*Specializing in Traffic Problems and in Methods to Improve Service and Increase Efficiency of Operation*
PIQUA, OHIO

C. B. BUCHANAN, President — W. H. PRICE, JR., Sec'y-Treas. — JOHN F. LAYNG, Vice-President
**BUCHANAN & LAYNG CORPORATION**
*Engineering and Management, Construction, Financial Reports, Traffic Surveys and Equipment Maintenance*
BALTIMORE, 825 Equitable Bldg. — Phone: Hanover 2142 — NEW YORK, 49 Wall Street

**THE P. EDWARD WISH SERVICE**
50 Church St. NEW YORK — *Street Railway Inspection* DETECTIVES — 131 State St. BOSTON

**Transmission Line and Special Crossing Structures, Catenary Bridges**
WRITE FOR OUR NEW DESCRIPTIVE CATALOG
**ARCHBOLD-BRADY CO.**
Engineers and Contractors — SYRACUSE, N. Y.

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

The Most Successful Men in the Electric Railway Industry read the
ELECTRIC RAILWAY JOURNAL
Every Week

**A. L. DRUM & COMPANY**
*Consulting and Constructing Engineers*
VALUATION AND FINANCIAL REPORTS
RATE STUDIES FOR PRESENTATION TO PUBLIC SERVICE COMMISSIONS
CONSTRUCTION AND MANAGEMENT OF ELECTRIC RAILWAYS
230 South Clark Street, Chicago, Ill. — 215 South Broad Street, Philadelphia, Pa.

**Bureau of Commercial Economics, Inc.**
*Industrial Engineers*
Organization · Methods · Layout and Facilities
Public and Industrial Relations
72 West Adams Street · CHICAGO



# Collier Service

A nation-wide organization building and sustaining car cardadvertising space values



**Barron G. Collier, Inc.**

Candler Bldg.

**New York**

# LUMNITE CEMENT

## *Defies Cold Weather*



Spaces between and along trolley tracks on the Boston Post Road at Darien, Conn. Eighteen hours after pouring, the pavement was opened to traffic, including heavy commercial trucks. Had ordinary concrete been used, weeks would have been lost

Columbia University Laboratory, in a test of Lumnite Cement under freezing conditions, placed cylinders of 1-2-4 Lumnite Cement concrete, immediately after mixing, in a refrigerator, the temperature of which was below freezing.

After being kept in the refrigerator for twenty-four hours and then thawed, the cylinders showed compressive strength of 2348 pounds to the square inch. Cylinders kept in the refrigerator for twenty-eight days showed compressive strength of 3315 pounds to the square inch.

THE speed possible with Atlas Lumnite Cement will insure the completion of your concrete work before freezing weather.

It can also be used at much lower temperature than other building cements.

For work that must be done in cold weather, Lumnite has the additional advantage that it can be used in much colder weather than other cements. It is less subject to injury from frost for two reasons:

*First*, the early hardening of Lumnite Cement brings the concrete, in a few hours, to a point in its curing beyond the danger of frost attack.

*Second*, this rapid hardening, a chemical action, produces in Lumnite Cement concrete very considerable heat. This is an additional insurance against the attack of frost.

Atlas Lumnite Cement makes *twenty-eight-day concrete in twenty-four hours* without the use of artificial accelerators. Lumnite Cement, because of its principal ingredient, obtained from high-grade aluminum ore, Bauxite, develops at twenty-four hours greater strength than that developed by other building cements at twenty-eight days.

The early completion, now, of your job, through the use of Lumnite, may effect big economies in time and money.

Whatever your construction problem, you should investigate the big savings Lumnite can make for you.

## THE ATLAS LUMNITE CEMENT CO.

*25 Broadway,* NEW YORK CITY

Brown-Marx Bldg., Birmingham 134 S. LaSalle St., Chicago




N. E. R. R. J.

SEND THIS COUPON TODAY

Please send your booklet on Lumnite, also detailed information on Lumnite's use for_____

*Name*_____

*Address*_____

# SHOCK





*Recent Installations of Dayton Resilient Tracks*

# DAYTON

# Keeps the Repair Shops Busy

A BLOW is as great a shock to the hammer as to the object struck. In street railway operation, the track is the anvil—the rolling stock the hammer. Since shock works both ways, it destroys the rolling stock no less than the track.

And there you have the reason for much of the repair to rolling stock. Little, perhaps, does the repair shop foreman realize that the track is to blame for so much of the work he has to do. In other words, the condition of the track largely determines the amount of rolling stock repair. Sagging joints and uneven track soon knock rolling stock to pieces. Rigid track is no less harmful.

Only by cushioning the shock of traffic can you eliminate this costly evil.

Resilient track construction is what is required to overcome the destructive effects of shock. Resiliency is now recognized as the one indispensable requisite for efficient tracks.

There you have the reason why the use of Dayton Resilient Track is increasing so rapidly. More of it will be laid this year than ever before in its history.

***Write us for any further information desired.***

The Dayton Mechanical Tie Co.

707 Commercial Building, Dayton, Ohio



**Resilient TIE**

Cushions the Shock On Rolling Stock




# If you did not attend the Convention

THERE was never an idle minute at the exhibit of SAFEWAY Six Wheel Coaches at the A. E. R. A. Convention. Day after day it was the center of an enthusiastic audience of transportation men and railway officials. Close observation of the SAFEWAY chassis in actual operation and a brief explanation of SAFEWAY engineering features demonstrated to these men that a new era in motor transportation had been born.

This quick and ready conviction is not to be wondered at. It is due to the work of railway engineers that four wheel rail equipment is now obsolete. These men immediately recognized the advantages of more wheels for heavy duty motor vehicles—they needed no prophet to predict the early arrival of the day when four wheel motor trucks and passenger coaches will be as antiquated as four wheel railway coaches.

If you did not see the SAFEWAY Six Wheel exhibit at Atlantic City, you missed the demonstration of a development in modern transportation which is of the utmost importance to the future of your business.

*The SAFEWAY story is told completely in a catalog now ready for distribution. We shall be glad to mail this catalog to any interested, responsible person upon request.*

## THE SAFEWAY SIX-WHEELER

**Made by the Six Wheel Company, 1800 W. Lehigh Avenue, Phila., Penna.**

# Let us Lend you a Lubricating Engineer



EXCESSIVE friction always produces these two effects: needless loss of power and rapid deterioration of the machine in which it occurs. As a result of such power losses, production costs are increased and the deterioration of machinery necessitates first costly repairs and in a short time complete replacement.

Excessive friction is usually due either to defective bearings or imperfect lubrication. If the bearings are defective, they should be adjusted or replaced. If incorrect lubrication is responsible, the proper grade of lubricant should be supplied in the proper amount and proper manner.

Unfortunately, the penalties which inefficient lubrication imposes, do not always become immediately apparent. In such cases, however, the loss and damage goes on steadily and may escape detection until the machine is damaged beyond repair.



## Standard Oils and Greases

offer a complete line of lubricants, one of which will properly lubricate every bearing on every machine. It is, however, advisable to have a lubricating engineer see that each oil and grease is put to proper use. Remember—each bearing, to be lubricated perfectly, requires an oil or grease of certain definite characteristics and qualities.

To insure the use of the correct lubricant for each bearing, this company maintains a staff of lubricating engineers who have not only had broad, practical plant experience, but have spent years in study and research in the company's laboratories.

Their services are free to the industries throughout the middle west and their recommendations, based on a careful survey of the individual plant, if followed, will prove the solution of the lubrication problem. They have demonstrated, time after time, their ability to cut power losses and operating costs, eliminate burned out bearings and the cost of replacing them, and safeguard valuable machines.



Upon request, we will gladly have one of our engineers visit your plant, analyze the lubrication requirements of each machine and give you the benefit of his recommendations. To avail yourself of this service would place you under no obligation to us.

Write, phone or wire your nearest branch office, today.



## STANDARD OIL COMPANY
(INDIANA)

**910 S. Michigan Avenue Chicago, Illinois**

| | | | | | |
|---|---|---|---|---|---|
| ILLINOIS | INDIANA | IOWA | MICHIGAN | WISCONSIN | MISSOURI |
| Chicago | Evansville | Davenport | Detroit | La Crosse | Kansas City |
| Decatur | Indianapolis | Des Moines | Grand Rapids | Milwaukee | St. Joseph |
| Joliet | South Bend | Mason City | Saginaw | MINNESOTA | St. Louis |
| Peoria | KANSAS | Sioux City | N. DAKOTA | Duluth | |
| Quincy | Wichita | S. DAKOTA | Fargo | Mankato | |
| | | Huron | Minot | Minneapolis | |



Make Beckwith-Chandler *Your* Standard

BECKWITH-CHANDLER'S

Varnishes and Colors

This label marks a superior grade of varnishes and colors manufactured to a consistent standard of quality for maximum durability. These materials are known and used in the paint shops of leading steam and electric railways. For every part of the car, from roof to trucks, inside and out there is a Beckwith-Chandler finish which will satisfy.

BECKWITH-CHANDLER CO. VARNISHES

BECKWITH-CHANDLER CO.
Manufacturers of
Highest Grade Varnishes.
NEW YORK, N.Y. — NEWARK, N.J.

Flat color and varnish systems — enamel systems—color varnish systems—for brush or spray application.

Also manufacturers of NEOLITE, the pyroxylin finish.




# Tune in on the weekly programs from STATION CCH

THIS is Station CCH, — the Consolidated Car-Heating Company, broadcasting the announcement of a series of weekly programs of vital interest to the electric railway industry, direct from its factory at Albany. This station is operating on a wave length of 100 per cent satisfaction.

For years, Consolidated Devices have been steadily building a reputation in the electric railway field for car comfort, car safety and car efficiency.

Just as Albany is recognized as headquarters of government for the Empire State, so is the Consolidated plant, located in the Capital City recognized as headquarters for devices that contribute to car service.

Each week, Station CCH will broadcast in *Electric Railway Journal,* interesting points regarding Consolidated Devices—

**Electric Car Heaters and Control**

**Pneumatic Door Operating Equipment**

**Car Signaling Devices**

Tune in on the weekly programs.

## CONSOLIDATED DEVICES




## CONSOLIDATED CAR-HEATING COMPANY

New York ALBANY Chicago



# Weight Helps the Pile Driver But Handicaps Car Wheels

WEIGHT is all right in a pile driver, but why move a heavy weight unless you are going to hit something with it?

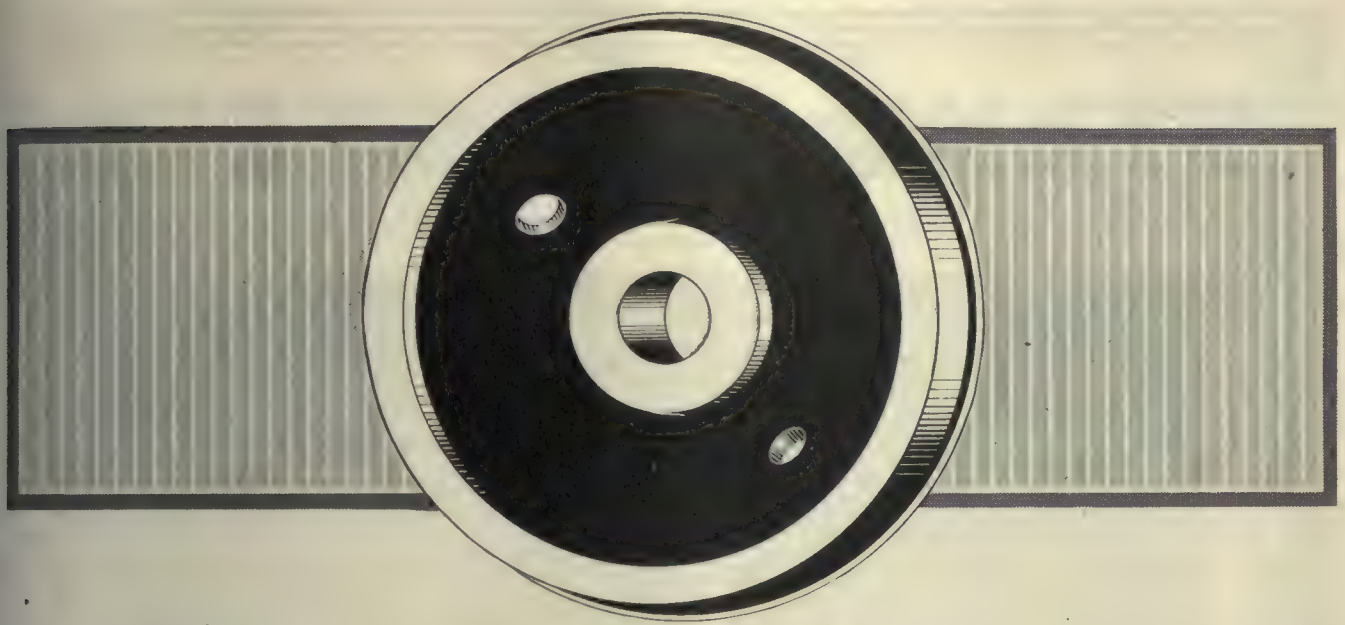
Weight in an electric railway car costs money to haul around.

To secure the stronger wheels demanded by modern service conditions it is unnecessary to go to heavier wheels.

Davis "One Wear" Steel Wheels are made from a tough, high manganese steel, superhardened by heat treatment, thus providing unequalled resistance to impact loads and permitting the safe use of a far lighter wheel.

**AMERICAN STEEL FOUNDRIES**

NEW YORK CHICAGO ST. LOUIS



# Quieter Operation of Street Railways Is Being Demanded

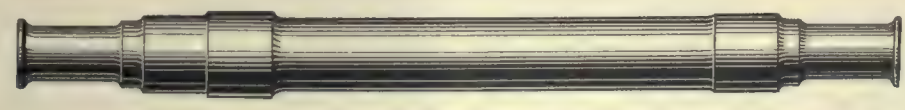
THE insistent demand of many communities for the quieter operation of street railways necessitates the equipment of cars with wheels of the highest grade which will not readily develop flat spots.

Cambria Rolled Steel Car Wheels—made at the Cambria Plant of Bethlehem Steel Company at Johnstown, Pa., will satisfy this demand in every respect.

They are made by a combination forging and rolling process at the proper temperature, which builds up an outside skin on the wheel tread and gives it a much longer wearing surface, thus adding materially to the life of the wheel.

Wheels are sized in solid dies to eliminate all eccentricity and flat spots, which insures quiet operation and maximum mileage.

A large quantity of rolled steel wheels are regularly carried in stock to facilitate deliveries. These wheels are of standard sizes and can be bored to meet customers' requirements.



Cambria Forged Axles for Street, Interurban, Subway and Elevated cars and armature shafts for electric service are made in the Axle Plant at the same works to meet any reasonable specification: treated or untreated; solid or hollow bored; smooth forged only; rough turned all over; or rough turned on journals and wheel seats.

***Specify Cambria Rolled Steel Car Wheels and Forged Axles on your next order.***

BETHLEHEM STEEL COMPANY, *General Offices:* BETHLEHEM, PA.

*Sales Offices:*

New York Boston Philadelphia Baltimore Washington Atlanta Pittsburgh
Buffalo Cleveland Detroit Cincinnati Chicago St. Louis San Francisco

*Bethlehem Steel Export Corporation, 25 Broadway, New York City, Sole Exporter of Our Commercial Products*

# BETHLEHEM

# STANDARD STEEL



A picture may suggest the method but it cannot show the care with which "Standard" Steel Tires and other Standard Steel Works Products are made.

The qualities built into steel are not apparent until called upon to meet requirements of service. State your requirements and we'll be glad to show you how we build a "Standard Quality" Tire, Wheel or Axle.

## STANDARD STEEL WORKS COMPANY

PHILADELPHIA, PA.

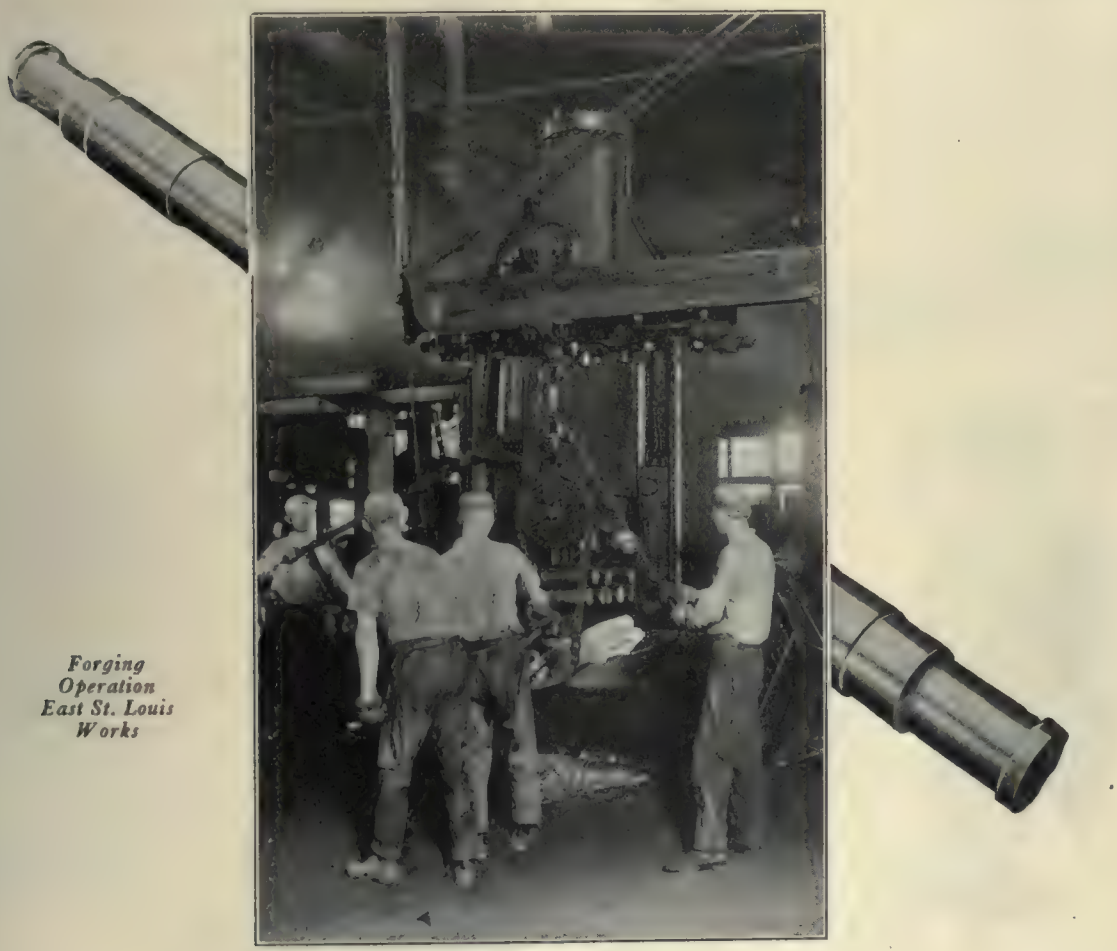
BRANCH OFFICES

CHICAGO
ST. LOUIS
NEW YORK
HOUSTON, TEXAS
PORTLAND, ORE.
RICHMOND, VA.
SAN FRANCISCO
BOSTON
ST. PAUL, MINN.
PITTSBURGH, PA.
LOS ANGELES, CAL.
MEXICO CITY, MEX.

WORKS: BURNHAM, PA.

# LACLEDE *Heat-Treated* AXLES

## TRADE VALSCO MARK



*Forging Operation East St. Louis Works*

Heat-treated axles insure economy. In Valsco axles an interesting story has been built around competent experts, latest type of equipment and scientific procedure. Valsco axles mean profitable investment and afford the desirable degree of safety.

## LACLEDE STEEL CO.

*Works:*
Alton, Illinois
Madison, Illinois
East St. Louis, Illinois

*General Offices:*
ARCADE BLDG., ST. LOUIS

*District Offices:*
Chicago, Illinois
Kansas City, Mo.
Detroit, Mich.

# Help 100,000 Destitute Children on "Golden Rule Sunday"

On Sunday, December 7th, there will be a world-wide observance of the Golden Rule—

*"Whatsoever ye would that men should do to you, do ye even so to them."*

The thousands of people who observe Golden Rule Sunday will eat on that day a meal of soup, bread, stewed fruit and cocoa. As they eat that simple meal, they will put themselves in the place of the thousands of orphan children who lack even such food. These men and women will remember the Golden Rule and give their contributions to buy food for the 100,000 hungry children in the Near East—fatherless, homeless and destitute children in Greece, Syria, Palestine and Armenia.



The lasting joy that comes from a simple act of kindness—an observance of the Golden Rule—can be yours, too. Every dollar you give to the Near East will buy twenty dinners of soup, bread, rice and cocoa for the Near East orphans. And $100 a year will feed, clothe and educate one of these children.

***Remember the Golden Rule on Sunday, December 7th***

*Remittance Form for Use on Monday, December 8th*

*To* CLEVELAND H. DODGE, *Treasurer,*
*Near East Relief, 151 Fifth Avenue, New York City*
*To help one of the orphaned children in the Near East under your care, I enclose $.....*
*NAME .....*
*ADDRESS .....*
.....

# Quality




The first consideration for good economical street car operation must be quality of equipment. Years ago More-Jones products successfully demonstrated that one of their features was fine quality—and this feature has come to be a characteristic one. Buyers of street car equipment think of More-Jones in terms of quality. Make a test of what this quality means in your service and specify More-Jones products the next time you order.

*Further information and prices on application*

MORE-JONES BRASS & METAL CO.
*St. Louis, Mo.*



**"Tiger" Bronze Axle and Armature Bearings**

Their exceptional toughness and high anti-frictional qualities insure great strength and slow, even rate of wear.



**M-J Armature Babbitt**

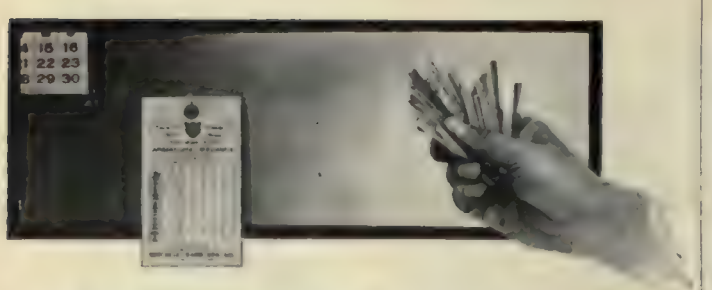
—for railway armature bearings, scientifically compounded of pure new tin, copper, antimony and metallic nickel—no lead. Lasts much longer, and guaranteed most economical.



**M-J Lubricated and V-K Oilless Trolley Wheels and Non-Arcing Harps**

The pure, new metal used in the wheels is exceedingly tough, yet does not grind away the metal of the wire. Perfect lubrication is accomplished automatically.

# MORE-JONES QUALITY PRODUCTS



Unmounted samples enable the mechanic to determine, by actual test, size and style best suited for each job.

Seven and one-half miles of samples! To produce 9000 sets of M-R Hard Maple Armature Wedges, each set comprising 21 styles 2½ inches long, over 8 linear miles of material was used.

**MITCHELL-RAND**
*"Everything in Insulation"*

Samples of M-R insulating materials —compounds, paints, varnishes, soldering paste, waxes, papers, cloths, twines, tapes, etc.—may be used as permanent indices of M-R quality; they are representative of the highest grades of merchandise.

This envelope awaits your name and address. You are invited to send for samples of any additional materials used in your work.




**MITCHELL-RAND MFG. CO.**
**15 Vesey St., NEW YORK, N. Y.**



TRADE

# ANDERSON

MARK

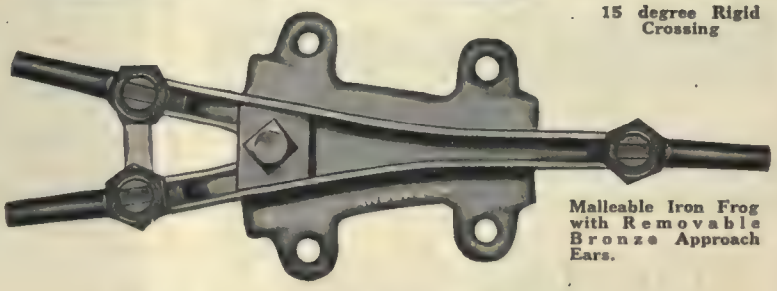


## Frogs and Crossings

When you install Anderson Frogs and Crossings you can be sure that you will get the maximum dependability and service even under the hardest conditions.

The thirty years experience that is behind the manufacture of all kinds of Overhead Line Material should be of benefit to you in helping you keep down your maintenance costs.

*Send for latest prices on Anderson's dependable Frogs and Crossings and other Overhead Material.*



15 degree Rigid Crossing

Malleable Iron Frog with Removable Bronze Approach Ears.

**Albert & J. M. Anderson Manufacturing Co.**

**289-305 A St., Boston, Mass.**

Chicago—105 S. Dearborn St.
New York—135 Broadway
Philadelphia—429 Real Estate Trust Bldg.
London, E. C. 2, 12 Moor Lane

# IRVINGTON VARNISHED Cambric



Have you made temporary repairs in the past? The difference between making permanent and temporary repairs on motors, transformers, cable joints, coils, etc., has in many instances depended upon the quality of varnished insulation used. If a cheap grade of insulation is used—it soon fails—and the repair is a temporary one.

Make all your repairs permanent ones by insisting on Irvington Varnished Cambric. In many cases, it is good for the life of the equipment.

It has stood and will stand the test of time. And the test of time is the only real test for insulation. Ask our sales representatives for sample and prices.

**Seven factors of Quality**

High Dielectric Strength — Non-Hygroscopic
High Resistance — Heat Resisting
Flexibility — Chemically Neutral
Maximum Elasticity

**IRVINGTON VARNISH & INSULATOR CO.**
Irvington, New Jersey.

*Established* 1905

*Sales Representatives:*

Mitchell-Rand Mfg. Co., New York
T. C. White Electric Supply Co., St. Louis
E. M. Wolcott, Rochester
Prehler Bros., Chicago
Consumers Rubber Co., Cleveland
Clapp & Lamoree, Los Angeles and San Francisco
F. G. Scofield, Toronto



Rounded Teeth

# Nuttall Gears

EVERY GEAR REGISTERED

*There isn't a bit of noise in a*

## Nuttall Gear

Nuttall Helical Gears are the most silent, easiest-operating, longest wearing and most economical gears made for traction service.

That's the whole story except that more and more of the leading traction companies are making Nuttall Gears standard equipment.

There are Nuttall Gears for every type of traction car, from the one-man safety to the large interurban express.

Examine a set of Nuttall Gears — see how the teeth are cut with rounded edges to facilitate easy installation and to prevent chipping and cutting — note also that there is no undercut at the tooth root where the greatest strength is required — Both of these minor details add materially to the life of the gears.

After you see and study these gears in operation you will wonder why you haven't adopted Nuttall Helical Gears long ago.

*Get our gear book, it will tell you the whole story.*

R.D. NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

IRVING SUBWAY
THE FIREPROOF VENTILATING FLOORING



# IRVING SAFKAR STEP

TRADE MARK

ALL-STEEL AND PERMANENTLY NON-SLIPPING

Getting-on-and-off accidents due to a slippery footing are next to impossible where this safety car step is used. And it's equally safe in clear or stormy weather. Water and snow—even oil or grease—do not destroy its foot-gripping quality. Dust does not accumulate on it, mud will not fill it up—it is a clean step, as well as a safe one. Economical, too—all steel. There's a size to meet your needs. Ask for Catalog 4A28.

## IRVING IRON WORKS CO.

LONG ISLAND CITY. N.Y.. U.S.A.

MANUFACTURERS OF

IRVING SUBWAY
TRADE MARK
(PATENTED) REG U S PAT OFF
THE FIREPROOF VENTILATING FLOORING

The Most Modern Motor Coach Seat

TRAVELUXE
No. 11 F
[Built in one- and two-passenger type]



Buy Snow Sweeper Rattan Now

**THE Traveluxe brings travel luxury to a point never before reached in motor coach seat-building. Such a seat sells bus service. It is as practical as it is comfortable. Saves seating space. Cuts upkeep costs. Easy to clean. Ask for detailed description.**

**The complete H-W line furnishes the most modern seating equipment for every bus service — metropolitan, inter-city, cross-town, station-to-station, sight-seeing, etc.**

**Whatever your seating problems, an H-W bus-seat expert, backed by our 98 years of seat-building, is at your command—without charge.**

Heywood-Wakefield Co. Sales Offices
HEYWOOD-WAKEFIELD CO.
1359 Railway Exchange Bldg., Chicago, Ill.
HEYWOOD-WAKEFIELD CO.
516 W. 34th St., New York
HEYWOOD-WAKEFIELD CO.
Monadnock Bldg., San Francisco
F. N. GRIGG
630 Louisiana Ave., Washington, D. C.
THE G. F. COTTER SUPPLY CO.
Houston, Tex.
THE RAILWAY AND POWER ENGINEERING CORP'N., Montreal and Toronto, Canada



Driver Seat
No. 10



Elec. Ry. Seat
No. 8-C-3



Tourease No. 8-C-5

Heywood-Wakefield
REG. U.S. PAT. OFF.





# "—removed our concrete for 1/5 the cost of handwork"

That is what an Ogden, Utah, contractor said about the

## Sullivan Portable Compressor and Sullivan Busters

which he used last spring on several miles of trench and for removing street pavement beside a railroad track.

He lists the following advantages which made money for him:

1—Fewer men needed.

2—Saved two-thirds to five-sixths of the time needed for hand labor.



Sullivan Concrete Breaker

*Bulletin 3281-D*

3—Adaptability of the portable compressor to varied air uses, such as drilling, pumping, running air hoists, etc.

The compressor is:

**The Sullivan "WK-31" 150-ft. gasoline engine driven machine, 28 H.P.**

The drills are:

**Two Sullivan 65-lb. "Busters," using chisel or gad bits:**

They will enable you to save time and labor on your job, too.

*Ask for Bulletin 3277-N*

SULLIVAN
TRADE MARK
MACHINERY COMPANY
150 S. Michigan Ave. Chicago



## *How would some like these aid your lines?*

THIS UNIVERSAL SAFETY Car has a seating capacity of 54—it is light weight (15 tons) and one or two-man operating arrangements have made it the outstanding recent advance in electric railway car design. Instant popularity has placed this car in a class by itself.

*Write for specifications.*

Quality **St. Louis Car Company** Safety

St. Louis, Mo.

*"The Birthplace of the Safety Car"*

# PETRY *Heater and Tuning-up* VALVE




*The* Edwards Railway Motor Car Co.
USES THE PETRY

SOME OTHER USERS

| | | |
|---|---|---|
| Boston Body Co | Fremont Metal Body Co. | G. C. Kuhlman Car Co |
| J. G. Brill Co | Garford Motor Truck Co. | Niagara Motor Boat Co. |
| Camden County Bus Association | General Motors Truck Co | Paterson Vehicle Co. |
| Champion Auto Equipment Co. | Hahn Motor Truck Co., Inc. | Pioneer Auto Works |
| Consolidated Body Co | Hampstead Mill and Body Works | Union Motor Truck Co. |
| Fifth Avenue Coach Co. | International Harvester Co. | Wiener Auto Body Co. |
| | International Motor Co | Yellow Coach Manufacturing Co. |

**N. A. PETRY COMPANY, Inc.**

**347 North Randolph St., Philadelphia, Pa.**

*Pacific Coast Representative:* Norman Cowan Co., 449-51 Rialto Bldg., San Francisco

Safety cars
make
safer dividends
when equipped with
"Tool Steel" gears + pinions

Tool Steel Quality

The Tool Steel
Gear and Pinion Co.
CINCINNATI, O.

*Lowering maintenance costs*

THIS INDUSTRIAL ELECTRIC LOCOMOTIVE CRANE on the Boston Elevated Ry., with an operator and two men, handles 540 ties per hour, and piles them 18 feet high. This work formerly took 12 men 2½ hours and they only piled 12 feet high. It handles 18,000 treated wood paving blocks per hour, a job formerly requiring 12 men for 4 hours.

With electro-magnet, clamshell bucket or hook, this crane handles iron and steel castings, scrap, car wheels, rail, trucks, sand, crushed stone and all bulk materials. The INDUSTRIAL is pre-eminent in lowering maintenance costs.

*Seventeen types of INDUSTRIAL cranes, capacities 5 to 200 tons, are standardly built. All are fully illustrated and described in our Golden Anniversary Catalog, which will be forwarded to you promptly upon request.*

INDUSTRIAL WORKS: BAY CITY, MICHIGAN






## Drip Points for Added Efficiency

They prevent creeping moisture and quickly drain the petticoat in wet weather, keeping the inner area dry.

The Above Insulator—No. 72—Voltages—Test—Dry 64,000. Wet 31,400. Line 10,000.

Our engineers are always ready to help you on your glass insulator problem. Write for catalog.

**Hemingray Glass Company**
Muncie, Ind.
Est. 1848—Inc. 1870

AMERICAN ELECTRICAL WORKS — AMELECTRIC — Wires and Cables — PHILLIPSDALE, R. I.

Reg. U. S. Pat. Office

Incandescent Lamp Cord

## AMELECTRIC PRODUCTS

BARE COPPER WIRE AND CABLE
TROLLEY WIRE
WEATHERPROOF WIRE AND CABLE
PAPER INSULATED UNDERGROUND CABLE
MAGNET WIRE

**AMERICAN ELECTRICAL WORKS**
PHILLIPSDALE, R. I.

Boston, 176 Federal; Chicago, 112 W. Adams; Cincinnati, Traction Bldg.; New York, 100 E. 42nd St.

AIMco



## SEND TODAY

for our new Publication on

**SAFETY** and **EFFICIENCY**

in Electric Railway Signals and Crossing Bells

American Insulating Machy. Co., Inc.
521 Huntingdon St., Philadelphia, Pa.

A



## PEIRCE
### Railway Feeder Pins

A strong Forged Steel Pin designed for heavy duty. Their low cost permits their use over the entire system

HUBBARD & COMPANY
PITTSBURGH CHICAGO



## STANDARD

WIRES, CABLES AND CABLE ACCESSORIES
*Manufactured by* STANDARD UNDERGROUND CABLE CO.
Boston, New York, Philadelphia, Washington, Pittsburgh, Chicago, Detroit, St. Louis, San Francisco




**WELDING CABLE**
**ELECTRICAL WIRES and CABLES**
John A. Roebling's Sons Company, Trenton, N. J.

## ANACONDA
### TROLLEY WIRE

ANACONDA COPPER MINING COMPANY
Conway Bldg., Chicago, Ill.

THE AMERICAN BRASS COMPANY
General Offices: Waterbury, Conn.




Trade Mark

## Shaw Lightning Arresters

*Standard in the Electric Industries for 35 years*

**Henry M. Shaw**
*150 Coit St., Irvington, Newark, N. J.*

## Chapman
### Automatic Signals

Charles N. Wood Co., Boston

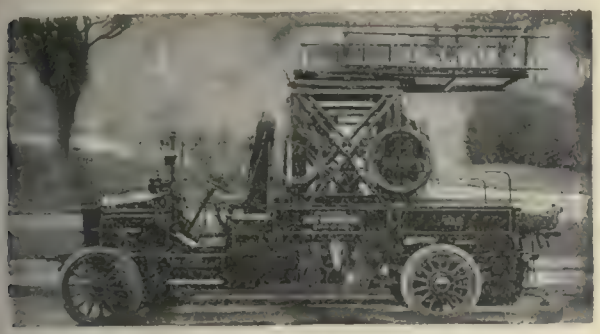


## AUTOMATIC SIGNALS

Highway Crossing Bells
Headway Recorders
Flasher Relays

NACHOD SIGNAL COMPANY, INC.
LOUISVILLE, KENTUCKY.





TRUCK WITH TOWER IN RUNNING POSITION

# TRENTON TOWER

## This 3-Section

is not only more convenient, but stronger than the older type.

The top section is reinforced by the intermediate section. The 3-section design makes it possible to raise the platform 16 inches higher and drop it 12 inches lower than can be done with the old-style 2-section tower.

We'll gladly send you details.

**J. R. McCARDELL CO.**
**Trenton, New Jersey, U. S. A.**

# American Rail Bonds

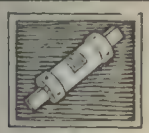
**CROWN**
**UNITED STATES**
**TWIN TERMINAL**
**SOLDER**
**TRIPLEX**

**Arc Weld and Flame Weld**

*Send for new Rail Bond Book*

**American Steel & Wire Company**
CHICAGO
NEW YORK

## J-P Products of interest to Electric Railways


NOARK *Fuses*


NOARK *Fuse Clips* CUTOUT BASES


NOARK *Service and Underground Boxes*


*Railway and Mine hangers and insulators*


J-P *Molding Service* [Contract Basis]


VULCABESTON *Sheet and Rope Packing*

**JOHNS-PRATT CO. HARTFORD, CONN.**

## Advertisements for the Searchlight Section



Can be received at the New York Office of Electric Railway Journal until 10 a. m.

# Wednesday

For issue out Saturday

0220

# PAGE STRAND

## PAGE-ARMCO IRON STRAND

Page-Armco Strand is produced from Armco Ingot Iron (99.84% pure) free from segregations which would tend to invite corrosion.
The heavy galvanized coating of pure zinc on Page-Armco Strand combined with the purity of the wire insures maximum service.

## PAGE HIGH CARBON STEEL STRAND

Page Galvanized Steel Strand is made in the following grades:
Page Commercial Strand
Page Siemens-Martin Strand
Page High Strength Strand
Page Extra High Strength Strand

*It conforms to exacting specifications of A.E.R.A., N.E.L.A. A.R.A.*

**Page Steel & Wire Co.**
An Associate Company of the AMERICAN CHAIN CO., INC.
BRIDGEPORT, CONNECTICUT, U. S. A.
District Sales Offices:
New York Pittsburgh Chicago
San Francisco

# THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

**Builders since 1868 of Water Tube Boilers of continuing reliability**

BRANCH OFFICES

BOSTON, 49 Federal Street
PHILADELPHIA, Packard Building
PITTSBURGH, Farmers Deposit Bank Building
CLEVELAND, Guardian Building
CHICAGO, Marquette Building
CINCINNATI, Traction Building
ATLANTA, Candler Building
PHOENIX, ARIZ., Heard Building
DALLAS, TEX., 2001 Magnolia Building
HONOLULU, H. T., Castle & Cooke Building
PORTLAND, ORE., 805 Gasco Building

THE BABCOCK & WILCOX COMPANY — STEAM

WORKS

Bayonne, N. J.
Barberton, Ohio

**Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893**

BRANCH OFFICES

DETROIT, Ford Building
NEW ORLEANS, 521-5 Baronne Street
HOUSTON, TEXAS, Southern Pacific Building
DENVER, 435 Seventeenth Street
SALT LAKE CITY, 405-6 Kearns Building
SAN FRANCISCO, Sheldon Building
LOS ANGELES, 404-6 Central Building
SEATTLE, L. C. Smith Building
HAVANA, CUBA, Calle de Aguiar 104
SAN JUAN, PORTO RICO, Royal Bank Building

## BARBOUR-STOCKWELL CO.

205 Broadway, Cambridgeport, Mass.
Established 1858

Manufacturers of

**Special Work for Street Railways**

Frogs, Crossings, Switches and Mates
Turnouts and Cross Connections
Kerwin Portable Crossovers
Balkwill Articulated Cast Manganese Crossings

ESTIMATES PROMPTLY FURNISHED

## A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut

## RAMAPO AJAX CORPORATION

Ramapo Automatic Return Switch Stands for Passing Sidings

RACOR

RACOR Tee Rail Special Work

Manganese Construction

GENERAL OFFICES: HILBURN, NEW YORK

Chicago New York Superior, Wis. Niagara Falls, N. Y.
Canadian Ramapo Iron Works, Ltd., Niagara Falls, Ont.

## Lorain Special Trackwork Girder Rails

*Electrically Welded Joints*

THE LORAIN STEEL COMPANY
Johnstown, Pa.

*Sales Offices:*

Atlanta Chicago Philadelphia Cleveland Pittsburgh New York

*Pacific Coast Representative:*
United States Steel Products Company
Los Angeles Portland San Francisco Seattle

*Export Representative:*
United States Steel Products Company, New York, N. Y.



## U. S. ELECTRIC AUTOMATIC SIGNAL

for single track block signal protection

United States Electric Signal Co.
West Newton, Mass.

BRAZED **Rail Bonds** ARC WELD

Portable Arc Welding Outfits

The Electric Railway Improvement Co.
Cleveland, Ohio

## ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.

Electrical Machinery, Steam Turbines, Steam Engines, Condensers, Gas and Oil Engines, Air Compressors, Air Brakes

The Most Successful Men in the Electric Railway Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

## NEW and RELAYING RAILS

1 TON OR 1000

TRACK EQUIPMENT

L. B. FOSTER CO.

RAIL ACCESSORIES

PITTSBURGH - PENNSYLVANIA

NEW YORK · JERSEY CITY · PHILADELPHIA · HAMILTON, O.

PERFECT
MICANITE
INSULATOR
Reg. U. S. Pat. Off.

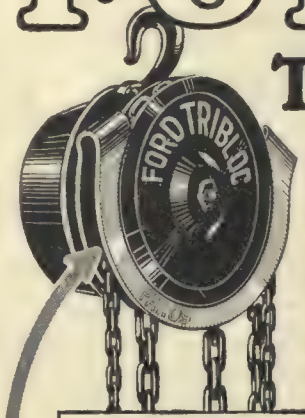
ELECTRICAL INSULATION

Micanite armature and commutator insulation, commutator segments and rings, plate, tubes, etc., Empire oiled insulating materials; Linotape; Kablak; Mico; and other products—for the electrical insulating requirements of the railway.

*Catalogs will gladly be furnished*

MICA INSULATOR COMPANY
*Sole Manufacturers of Micanite*
*Established* 1893
68 Church St., New York 542 So. Dearborn St., Chicago
Works: Schenectady, N. Y.
8-F

FORD
TRIBLOC




Look for the Green Loop Guide

For the car shop
A quick, easy, but sure method of speeding up work in the car shop—and keeping your rolling stock on the road where it will bring in revenue—is to provide your men with Tribloc on the many lifting jobs inseparable from car shop work.
*Send for Catalog 6-B*
FORD CHAIN BLOCK COMPANY
2nd and Diamond Streets, Philadelphia, Pa.

CHAIN HOISTS

We are prepared
to handle any high grade proposition where
VARNISHED CAMBRIC
Wires and Cables
are required.
When using *quality* Wires and Cables use *quality* Tapes.
"MANSON" Tape, "OKONITE" Tape, "DUNDEE" Tapes.
THE OKONITE CO., Passaic, N. J.
Incorporated 1884
OKONITE
TRADE MARK
*Sales Offices: New York—Atlanta—Pittsburgh—San Francisco.*
*Agents:* Central Electric Co., Chicago, Ill. Pettingell-Andrews Co., Boston, Mass.; The F. D. Lawrence Electric Co., Cincinnati, Ohio; Novelty Electric Co., Philadelphia, Pa.
*Canadian Representatives:* Engineering Materials Limited, Montreal.

B. A. HEGEMAN, Jr., President C. C. CASTLE, First Vice-President
H. A. HEGEMAN, Vice-Pres. and Treas. F. T. SARGENT, Secretary
W. C. PETERS, Manager Sales and Engineering
National Railway Appliance Co.
Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., New York
Munsey Bldg., Washington, D. C. 100 Boylston St., Boston, Mass.
Hegeman-Castle Corporation, Railway Exchange Building, Chicago.
RAILWAY SUPPLIES
Tool Steel Gears and Pinions
Bell Locked Fare Box and Change Maker
The Aluminum Field Coils
Truck and Car Repair Parts
Cutler-Hammer Electric Heaters
Pittsburgh Forge & Iron Co.'s Products
Genesco Paint Oils
E. Z. Car Control Corporation's Safety Devices
Garland Ventilators
Flaxlinum Insulation
Yellow Coach Mfg. Co.'s Single and Double Deck Busses
Economy Electric Devices Co.'s Power Saving and Inspection Meters
Anglo-American Varnish Co., Varnishes, Enamels, etc.
Gilmer Multiple Safety Step Treads
National Hand Holds
Ft. Pitt Spring & Mfg. Co., Springs
Turnstile Car Corporation's Turnstiles
Anderson Slack Adjusters
Feasible Drop Brake Staffs
Dunham Hopper Door Device

OXYGEN, ACETYLENE, HYDROGEN
*for cutting, welding, etc.*
Quick shipment and low prices also on cylinders, valves, torches, regulators and supplies.
INTERNATIONAL OXYGEN COMPANY
Main Offices: Newark, N. J.
Branch Offices: New York Pittsburgh Toledo

FERALITE
ALUMINO-THERMIC JOINTS
New and independent process. No inserts needed.
Up-to-date and economical.
Alumino-Thermic Corp., Roselle Park, N. J.

'CARNEGIE'
for
WHEELS
AXLES
RAILS
CROSS TIES



Carnegie Steel Company
PITTSBURGH, PENNA.




Type R-11
Double Register

## International Registers

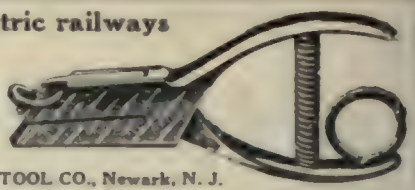
Made in single and double types to meet requirements of service. For hand or foot, mechanical or electric operation. Counters, car fittings, conductors' punches.

Exclusive selling agents for HEEREN ENAMEL BADGES.

**The International Register Co.**
15 South Throop Street, Chicago, Illinois

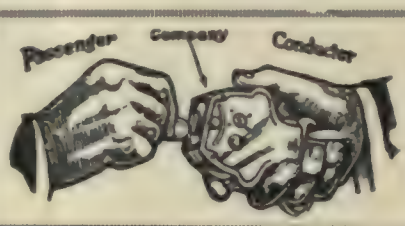
75% of the electric railways use

**B-V Punches**



*Send for Catalog*

BONNEY-VEHSLAGE TOOL CO., Newark, N. J.




**Direct Automatic Registration By the Passengers**

Rooke Automatic Register Co.
Providence, R. I.

Let Us Tell You of Our Especially Designed Fare Box for the

**ONE MAN CAR**

**THE CLEVELAND FARE BOX COMPANY**
Cleveland, Ohio
Canadian Cleveland Fare Box Co., Ltd., Preston, Ontario

**SAMSON SPOT WATERPROOFED TROLLEY CORD**



Trade Mark Reg. U. S. Pat. Off.
Made of extra quality stock firmly braided and smoothly finished. Carefully inspected and guaranteed free from flaws. Samples and information gladly sent.

SAMSON CORDAGE WORKS, BOSTON, MASS.

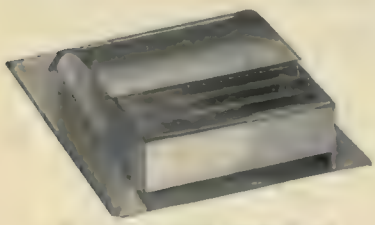


*Gets Every Fare*
**PEREY TURNSTILES or PASSIMETERS**
Use them in your Prepayment Areas and Street Cars

Perey Manufacturing Co., Inc.
101 Park Avenue, New York City

**HALE-KILBURN CAR SEATS**
*For Every Class of Service*
General Offices and Works: Philadelphia
Offices: New York, Chicago, St. Louis, Washington, San Francisco

# Comfortable Passengers—Comfortable Profits



N-L Type "C" Arch Roof Ventilator

Passengers like warm air, but it must be fresh. And if it rides in on a draft, there's discomfort, complaint, reduced patronage.

N-L Ventilators change *all* the air in the car many times each hour....*without drafts*....and snow or rain cannot get in. Which assures comfortable passengers. Where comfortable passengers lead, comfortable profits follow.

*Write for "Superior Ventilation," a booklet describing in detail the various N-L Ventilators for street car and bus use.*

N-L

**The Nichols-Lintern Co.**
7960 Lorain Ave. Cleveland, Ohio
Canadian Rep.: Railway & Power Eng. Corp., Ltd., 133 Easter Ave., Toronto

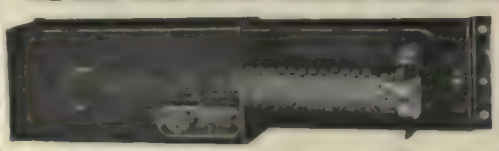
**"Boyerized" Products Reduce Maintenance**

| | |
|---|---|
| Bemis Trucks | Manganese Brake Heads |
| Case Hardened Brake Pins | Manganese Transom Plates |
| Case Hardened Bushings | Manganese Body Bushings |
| Case Hardened Nuts and Bolts | Bronze Axle Bearings |

Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.

**Bemis Car Truck Co., Springfield, Mass.**

THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



**No. 478E**

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.

PS HEATERS

**Car Heating and Ventilation**

are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

**The Peter Smith Heater Company**
6209 Hamilton Ave., Detroit, Mich.

**RAILWAY UTILITY COMPANY**

CAR COMFORT WITH **UTILITY**

HEATERS
REGULATORS
VENTILATORS

141-151 West 22d St. Chicago, Ill.

*Write for Catalogue*

1328 Broadway New York, N. Y.

You're having brush trouble

CORRECT IT

USE LE CARBONE CARBON BRUSHES

They talk for themselves

COST MORE PER BRUSH
COST LESS PER CAR MILE

**W. J. Jeandron**
345 Madison Avenue, New York
Pittsburgh Office: 634 Wabash Bldg.
Chicago Office: 1657 Monadnock Block
San Francisco Office: 525 Market Street
Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal and Toronto

# BRAKE SHOES

## AERA Standards
## Brake Heads



Diamond "S" Steel Back and Lug Shoes best for all equipment.

Manufactured and sold under U. S. Patent and Registered Trade Mark.

**American Brake Shoe and Foundry Co.**
30 Church Street, New York
332 So. Michigan Ave., Chicago

Clip time—clip costs with the
## FLOWER BRUSH HOLDER

*Reversible—Replaceable Box*

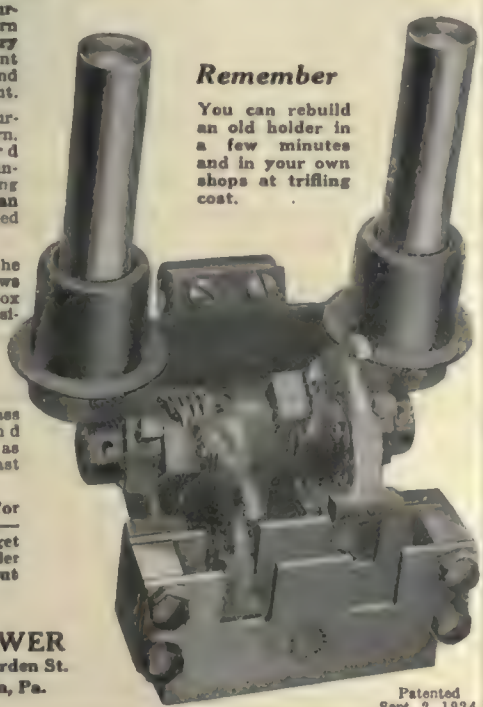
To start with this box is made of rolled plate which of course wears longer than the softer cast metal.

When inner surfaces have worn it is necessary only to put front plate in rear and rear plate in front.

When all four surfaces are worn, new standard parts are obtainable at trifling cost,—a stock can easily be carried at all times.

What's more the four cap screws that bind the box together are positively secured against loosening by a special form of soft brass locking band washer. Just as secure as a cast box.

Write now for further details,—or better still get a Flower Holder and try it out yourself.



*Remember*

You can rebuild an old holder in a few minutes and in your own shops at trifling cost.

Patented Sept. 2, 1924

**D. B. FLOWER**
1217 Spring Garden St.
Philadelphia, Pa.

# Griffin Wheel Company
410 North Michigan Ave.
Chicago, Ill.

# GRIFFIN F. C. S. WHEELS

## For Street and Interurban Railways

FOUNDRIES:

| | | |
|---|---|---|
| Chicago | Boston | St. Paul |
| Detroit | Kansas City | Los Angeles |
| Denver | Council Bluffs | Tacoma |



"Differential Two-Car Train. Trailer dumping load clear of trench."

## DIFFERENTIAL CARS

**Standard on Fifty Railways for**

| | |
|---|---|
| Track Maintenance | Track Construction |
| Ash Disposal | Hauling Crossties |
| Placing Ballast | Disposal of Waste |
| Coal Hauling | Snow Disposal |

Concrete Materials to the Job
Excavated Material to the Dump

*For Economy*

THE CLARK CONCRETE BREAKER
THE DIFFERENTIAL BOTTOM DUMP CAR
THE DIFFERENTIAL COMBINATION
CAR-WHEEL TRUCK and TRACTOR

**THE DIFFERENTIAL STEEL CAR CO.**
Findlay, Ohio, U. S. A.



## Complete satisfaction

Operating perfectly and requiring minimum attention for maintenance and lubrication, Earll Catchers and Retrievers give genuinely satisfactory results. Their refinement of design, and mechanical superiority are summarized in the following five features, peculiar to Earll construction.

**No-wear Check Pawl**
**Free-Winding Tension Spring**
**Ratchet Wind**
**Emergency Release**
**Perfect Automatic Lubrication**

Earll Catchers and Retrievers

**C. I. EARLL, York, Pa.**

TULC — A LUBRICANT

We make a specialty of

## ELECTRIC RAILWAY LUBRICATION

We solicit a test of TULC on your equipment

**The Universal Lubricating Co.**
Cleveland Ohio
Tulc, Inc., Eastern Representative,
1617 Gotham National Bank Bldg., New York City

## The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



**THE STAR BRASS WORKS**
KALAMAZOO, MICH., U. S. A.



## The "Ideal" Trolley Wheel

*For Electric Railway and Crane Service*

Our new type, low carbon steel flanges are softer than the overhead, thereby conserving it.

Perfect balance allows the Ideal to follow the wire more closely and with less spring tension.

The contact ring and hub is made of pure new copper with a small amount of tin, giving a low electrical resistance.

**EDWARD P. SHARP**
L. E. HARMON, Prop.
308-14 Terrace
Buffalo, N. Y.

*Sales Representatives:*
R. D. NUTTALL CO.
Pittsburgh, Pa.
NATIONAL BRAKE CO., Inc.
Buffalo, N. Y.

## PANELYTE

HEADLININGS

THE PANELYTE COMPANY, Trenton, N. J.

## PROVIDENCE FENDERS

## H-B LIFE GUARDS

The Consolidated Car Fender Co., Providence, R. I.
Wendell & MacDuffie Co., 110 E. 42nd St., New York
General Sales Agents

# SEARCHLIGHT SECTION

## USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD:

*Positions Wanted*, 4 cents a word, minimum 75 cents an insertion, payable in advance.

*Positions Vacant* and all other classifications, 8 cents a word, minimum charge $2.00.

*Proposals*, 40 cents a line an insertion.

INFORMATION:

*Box Numbers* in care of any of our offices count 10 words additional in undisplayed ads.

*Discount* of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 to 3 inches.....$4.50 an inch
4 to 7 inches..... 4.30 an inch
8 to 14 inches..... 4.10 an inch

Rates for larger spaces, or yearly rates, on request.

An *advertising inch* is measured vertically on one column, 3 columns—30 inches—to a page.

E.F.J.

### POSITION VACANT

ELECTRIC tramway superintendent wanted for West Indies. Excellent living conditions, delightful climate, good pay. Position suitable for young man with professional training and practical experience. P-751, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

### POSITIONS WANTED

AUDITOR or assistant. Twenty years' experience in electric light, power and railways. At present employed but desire to make change. PW-750, Elec. Ry. Journal, Leader-News Bldg., Cleveland, Ohio.

EXECUTIVE. Urban and interurban. Wide successful experience in all departments of construction and operation. PW-740, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

EXPERIENCED operating man, now employed, desires change. Technical graduate, forty-one years of age, sixteen years' experience covering all branches of electric railway operation, eight years in the transportation end, with large railway company in the east. Best of references from men high in electric railway field. Desire to connect with company where ability can be demonstrated and where there is opportunity for advancement. PW-747, Electric Railway Journal, 10th Ave. at 36th St., New York.

*When Writing Your Ad*

Provide an indexing or subject word.

Write it as the first word of your ad.

If it is a Position Wanted or Position Vacant ad, make the first word the kind of position sought or offered.

This will assure proper classification in the column.

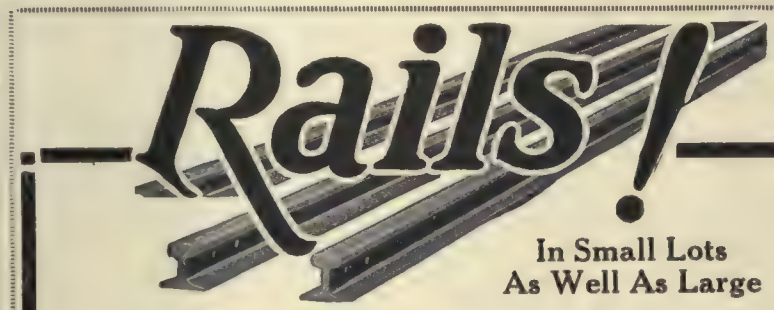
The right is reserved to reject, revise or properly classify all Want Advertisements.

*Proper Classification*

*increases the possibility of*

*Prompt Returns*

0301




**In Small Lots As Well As Large**

**THERE is a class of rail buyers, occasionally in need of only small tonnages, who are paying a premium on their purchases elsewhere because they believe that we do not seek their patronage.**

We maintain a large organization to give efficient service on small orders. Our tremendous volume gives us unequaled buying power and saves our clients money regardless of the tonnage required.

Immense stocks at strategic distributing points provide complete assortments near you. This adds a saving in freight to our already unbeatable prices.

Next time you need rails, let us know your requirements.

*We guarantee the same prompt, efficient service to all.*

**HYMAN-MICHAELS COMPANY**

*"The House of Dependable Service"*

**122 South Michigan Avenue, Chicago**

**Dealers in New and Relaying Rails, Locomotives and Railway Equipment**

*District Offices:* New York, Woolworth Bldg.; St. Louis, Railway Exchange Bldg.; Pittsburgh, First Nat'l Bank Bldg.; San Francisco, 234 Steuart St.

*Yards:* St. Louis, East Chicago, Ind., McKee's Rocks, Pa., San Francisco.

*Cable Address:* "Hymanmikel"

*World's Largest Distributors of Rails*

WANTED

**SEVERAL RAILS**

Second Hand

Lorain Steel Company's section 90, No. 317.

ROME RAILWAY & LIGHT COMPANY
Rome, Georgia

WE WANT TO BUY

30—West. 306-C.V.-4

**MOTORS**

Have you any to offer?

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

**NEW GEARS, PINIONS AND GEAR CASES FOR SALE**

GE-1000 Motor:
173 15 tooth pinions
107 69 tooth gears
16 Sheet iron gear cases
GE-800 Motor:
4 malleable gear cases and 3 bottom halves
FS-749, Electric Railway Journal
10th Ave. at 36th St., New York City

**RAILS**

New Relaying

1 TON = 1000

FROGS
SWITCHES
SPLICE BARS
BOLTS
NUTS
TIE PLATES
RAIL
BRACES

All Rails and Track Materials shipped subject to inspection and approval at destination.

**L. B. Foster Co.**

PITTSBURGH-PA
NEW YORK
L.B.F.CO.

FOR SALE

**MOTORS**

18—G.E. 264; practically new.

TRANSIT EQUIPMENT COMPANY
501 Fifth Ave., New York

# WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

**Advertising, Street Car**
Collier, Inc., Barron G.

**Air Receivers & Aftercoolers**
Ingersoll-Rand Co.

**Anchors, Guy**
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

**Armature Shop Tools**
Elec. Service Supplies Co.

**Automatic Return Switch Stands**
Ramapo Ajax Corp

**Automatic Safety Switch Stands**
Ramapo Ajax Corp.

**Axles**
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Johnson & Co., J. R.
St. Louis Car Co.
Standard Steel Works

**Axles, Steel**
Carnegie Steel Co.
Laclede Steel Co.

**Badges and Buttons**
Elec. Service Supplies Co.
Int Register Co. The

**Bearings and Bearing Metals**
Bemis Car Truck Co.
General Electric Co.
More-Jones Brass & Metal Co.
St. Louis Car Co.
Westinghouse E. & M. Co.

**Bearings, Center and Roller Side**
Stucki Co., A.

**Bells and Gongs**
Brill Co. The J. G.
Elec. Service Supplies Co
St. Louis Car Co.

**Boilers**
Babcock & Wilcox Co.

**Bond Testers**
Amer. Steel & Wire Co
Elec. Service Supplies Co.

**Bonding Apparatus**
Amer. Steel & Wire Co.
Electric Railway Impt Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Track-work Co
Rail Welding & Bonding Co.

**Bonds, Rail**
Electric Railway Impt Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Page Steel & Wire Co.
Railway Track-work Co.
Rail Welding & Bonding Co
Westinghouse E. & M. Co.

**Boxes, Switch**
Johns-Pratt Co.

**Brackets and Cross Arms (See also Poles, Ties, Posts, etc.)**
American Bridge Co.
Bates Expanded Steel Truss Co.
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

**Brake Adjusters**
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.

**Brake Shoes**
Amer. Br. Shoe & Fdy. Co.
Barbour Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co

**Brakes, Brake Systems and Brake Parts**
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co. The J. G.
General Electric Co.
Johns-Manville, Inc.
National Brake Co.
St. Louis Car Co
Safety Car Devices Co.

**Brushes, Carbon**
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Westinghouse E. & M. Co.

**Brush Holders**
D. B. Flower

**Brushes, Wire Pneumatic**
Ingersoll-Rand Co.

**Bulkheads**
Haskelite Mfg. Co.

**Buses, Motor**
Brill Co., The J. G.
International Motor Co.
St. Louis Car Co.
Six Wheel Co

**Bus Seats**
Hale-Kilburn Co.
Heywood-Wakefield Co

**Bushings, Case Hardened and Manganese**
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.

**Cables (See Wires and Cables)**

**Cambric Tapes, Yellow and Black Varnished**
Irvington Varnish & Ins. Co.
Mica Insulator Co.

**Carbon Brushes (See Brushes, Carbon)**

**Car Panel Safety Switches**
Westinghouse E. & M. Co.

**Cars, Dump**
Differential Steel Car Co.
St. Louis Car Co.

**Car Lighting Fixtures**
Elec. Service Supplies Co.

**Car Panel Safety Switches**
Consolidated Car Heat'g Co.
Westinghouse E. & M. Co.

**Car Steps Safety**
Irving Iron Works

**Cars, Passenger, Freight, Express, etc**
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg Co
National Ry. Appliance Co
St. Louis Car Co.
Wason Mfg. Co.

**Cars, Gas Rail**
St. Louis Car Co.

**Cars, Self-Propelled**
General Electric Co.

**Car Wheels, Rolled Steel**
Bethlehem Steel Co

**Castings, Brass, Composition or Copper**
Anderson Mfg. Co., A. & J. M.
More-Jones Brass & Metal Co.

**Castings, Gray Iron and Steel**
American Steel Foundries
Bemis Car Truck Co
St. Louis Car Co
Standard Steel Works

**Castings, Malleable and Brass**
Amer Br Shoe & Fdy. Co
Bemis Car Truck Co.
St. Louis Car Co

**Catchers and Retrievers, Trolley**
Earll, C. I.
Elec. Service Supplies Co
Ohio Brass Co
Wood Co., Chas. N.

**Catenary Construction**
Archbold-Brady Co.

**Cement Products**
Atlas Lumnite Co

**Change Carriers**
Cleveland Fare Box Co.

**Circuit-Breakers**
Anderson A. & J. M., Mfg. Co.
General Electric Co
Westinghouse E. & M. Co.

**Clamps and Connectors for Wires and Cables**
Elec. Ry Equipment Co.
Elec. Service Supplies Co
General Electric Co
Hubbard & Co
Ohio Brass Co
Westinghouse E. & M. Co.

**Cleaners and Scrapers, Track (See also Snow-Plows, Sweepers and Brooms)**
Brill Co., The J. G.
St. Louis Car Co

**Clusters and Sockets**
General Electric Co

**Coal and Ash Handling (See Conveying and Hoisting Machinery)**

**Coil Banding and Winding Machines**
Elec. Service Supplies Co.

**Coils, Armature and Field**
General Electric Co
Westinghouse E. & M. Co.

**Coils, Choke and Kicking**
Elec. Service Supplies Co.
General Electric Co
Westinghouse E. & M. Co.

**Coin Counting Machines**
Cleveland Fare Box Co.
Intern'l Register Co
Johnson Fare Box Co

**Coin Sorting Machines**
Cleveland Fare Box Co.

**Coin Wrappers**
Cleveland Fare Box Co.

**Commutator Slotters**
Elec. Service Supplies Co.
General Electric Co
Westinghouse E. & M. Co

**Commutator Truing Devices**
General Electric Co

**Commutators or Parts**
Cameron Elec'l Mfg. Co.
General Electric Co.
Mica Insulator Co.
Westinghouse E. & M. Co.

**Compounds (Insulating & Splicing)**
Johns-Manville, Inc.

**Compressors, Air**
General Electric Co.
Ingersoll-Rand Co.
Sullivan Machinery Co.
Westinghouse Tr. Br. Co.

**Compressors, Air Portable**
Ingersoll-Rand Co.
Sullivan Machinery Co.

**Compressors, Gas**
Sullivan Machinery Co.

**Concrete Flooring Surface**
Irving Iron Works

**Concrete Reinforcing Bars**
Laclede Steel Co.

**Condensers**
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.

**Condenser Papers**
Irvington Varnish & Ins. Co.

**Connectors, Solderless**
Westinghouse E. & M. Co.

**Connectors, Trailer Car**
Elec. Service Supplies Co.
Ohio Brass Co.

**Controllers or Parts**
General Electric Co
Westinghouse E. & M. Co.

**Controller Regulators**
Elec. Service Supplies Co.

**Controlling Systems**
General Electric Co.
Westinghouse E. & M. Co.

**Converters, Rotary**
Allis-Chalmers Mfg. Co.
General Electric Co
Westinghouse E. & M. Co.

**Conveying and Hoisting Machinery**
Columbia M. W. & M. I. Co

**Copper Wire**
Anaconda Copper Mining Co.
Page Steel & Wire Co.

**Cord, Bell, Trolley, Register**
Brill Co., The J. G.
Elec. Service Supplies Co.
Intern'l Register Co., The
Roebling's Sons Co., J. A.
St. Louis Car Co.
Samson Cordage Works

**Cord Connectors and Couplers**
Elec. Service Supplies Co
Samson Cordage Works
Wood Co., Chas. N.

**Couplers, Car**
American Steel Foundries
Brill Co., The J. G.
Ohio Brass Co
St. Louis Car Co.
Westinghouse Tr. Br. Co.

**Cranes**
Allis-Chalmers Mfg. Co.
Industrial Works

**Cranes, Gas or Electric**
Industrial Works

**Cranes, Locomotive, Motor Truck & Portable**
Industrial Works

**Cross Arms (See Brackets)**

**Crossing Foundations**
International Steel Tie Co

**Crossings**
Ramapo Ajax Corp

**Crossing Signals (See Signals, Crossing)**

**Crossing, Frog & Switch**
Ramapo Ajax Corp

**Crossing Manganese**
Bethlehem Steel Co
Ramapo Ajax Corp

**Crossings, Track (See Track, Special Work)**

**Crossings, Trolley**
Anderson Mfg. Co., A. & J. M
Ohio Brass Co

**Curtains and Curtain Fixtures**
Brill Co., The J. G.
Elec. Service Supplies Co
Morton Mfg. Co
St. Louis Car Co.

**Dealer's Machinery**
Elec. Equipment Co.
Hyman-Michaels Co.
Transit Equip. Co.

**Derailing Devices (See also Track Work)**
Wharton, Jr., & Co., Wm

**Derailing Switches, Tee Rail**
Ramapo Ajax Corp.

**Detective Service**
Wish-Service, P. Edward

**Doors & Door Fixtures**
Hale-Kilburn Co.
St. Louis Car Co

**Door Operating Devices**
Brill Co., The J. G.
General Electric Co.
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co

**Doors, Folding Vestibule**
Nat'l Pneumatic Co., Inc.

**Drills, Rock**
Sullivan Machinery Co.

**Drills, Track**
Amer. Steel & Wire Co.
Elec. Service Sup. Co.
Ingersoll-Rand Co.
Ohio Brass Co.

**Dryers, Sand**
Elec. Service Supplies Co.

**Ears**
Anderson Mfg. Co., A. & J. M
Ohio Brass Co.

**Ebony Asbestos Wood**
Johns-Manville, Inc

**Electrical Wires and Cables**
Amer. Electrical Works
Roebling's Sons & Co., J. A.

**Electric Grinders**
Railway Track-work Co.
Rail Welding & Bonding Co.

**Electrodes, Carbon**
Railway Track-work Co.

**Electrodes, Steel**
Railway Track-work Co.

**Engineers, Consulting, Contracting and Operating**
Allison & Co., J. S.
Archbold-Brady Co.
Beeler, John A.
Buchanan & Layng Corp.
Bureau of Comm. Economics, Inc.
Byllesby & Co., H. M.
Day & Zimmermann, Inc
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Ong, Joe R.
Railway Audit & Inspection Co.
Richey, Albert S.
Robinson & Co., D. P.
Sanderson & Porter
Stevens & Wood, Inc.
Stone & Webster
White Eng. Corp., The J. G

**Engines, Gas, Oil or Steam**
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse E & M. Co

**Exterior Side Panels**
Haskelite Mfg. Co.

**Fare Boxes**
Cleveland Fare Box Co
Johnson Fare Box Co
Nat'l Ry. Appliance Co

**Fences, Woven Wire and Fence Posts**
Amer. Steel & Wire Co.
Cyclone Fence Co.

**Fenders and Wheel Guards**
Brill Co., The J. G.
Consolidated Car Fender Co
Elec. Service Supplies Co
St. Louis Car Co.
Star Brass Works

**Fibre and Fibre Tubing**
Johns-Manville, Inc
Westinghouse E. & M. Co

**Field Coils (See Coils)**

**Fire Extinguishers**
Johns-Manville, Inc

**Flexlinum Insulation**
Nat'l Ry. Appliance Co.

**Floodlights**
Elec. Service Supplies Co.

**Flooring Composition**
Johns-Manville, Inc.

**Flooring, Fireproof**
Irving Iron Works

**Flooring, Non-Slipping**
Irving Iron Works

**Flooring, Open Steel**
Irving Iron Works

**Flooring, Steel Subway**
Irving Iron Works

**Flooring, Ventilating**
Irving Iron Works

**Forgings**
Standard Steel Works Co

**Frogs & Crossings, Tee Rail**
Bethlehem Steel Co
Ramapo Ajax Corp

**Frogs, Track (See Track Work)**

**Frogs, Trolley**
Anderson Mfg. Co., A. & J. M
Ohio Brass Co

**Fuses, Cartridge, Non-Refillable and High Voltage**
Johns-Pratt Co

**Fuses, Cartridge, Refillable**
Johns-Pratt Co.

**Fuses and Fuse Boxes**
General Electric Co
Westinghouse E. & M. Co

**Fuses, Refillable**
General Electric Co.

**Gaskets**
Johns-Manville, Inc
Westinghouse Tr. Br. Co

**Gas-Electric Cars**
General Electric Co

**Gas Producers**
Westinghouse E. & M. Co

**Gates, Car**
Brill Co., The J. G.
St. Louis Car Co.

**Gear Blanks**
Bethlehem Steel Co
Standard Steel Wks. Co.

**Gear Cases**
Chalmers-worth Mfg. Co.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

**Gears and Pinions**
Bemis Car Truck Co.
Bethlehem Steel Co.
Elec. Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

**Generating Sets, Gas-Electric**
General Electric Co.

**Generators**
Allis-Chalmers Mfg. Co.
General Electric Co
Westinghouse E. & M. Co.

**Girder Rails**
Bethlehem Steel Co.
Lorain Steel Co.

**Gong (See Bells and Gongs)**

**Grating, Steel Subway**
Irving Iron Works

**Greases (See Lubricants)**

**Grinders and Grind. Supplies**
Railway Track-work Co.

**Grinders, Portable**
Buda Company
Railway Track-work Co.

**Grinders, Portable Electric**
Railway Track-work Co.

**Grinding Blocks and Wheels**
Railway Track-work Co

**Ground Wires**
Page Steel & Wire Co.

**Guard Rail Clamps**
Ramapo Ajax Corp.

**Guard Rails, Tee Rail & Manganese**
Ramapo Ajax Corp.

**Guards, Trolley**
Elec. Service Sup. Co.
Ohio Brass Co

**Hammers, Pneumatic**
Ingersoll-Rand Co.

**Harps, Trolley**
Elec. Service Supplies Co.
More-Jones Brass & Metal Co
Nuttall Co., R. D. & Co.
Star Brass Works
Thornton Trolley Wheel Co.

**Headlights**
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co
St. Louis Car Co.

**Headlining**
Haskelite Mfg. Co.
Panelyte Co.

**Heaters, Bus**
N. A. Petry Co., Inc.

**Heaters, Car (Electric)**
Gold Car Heat. & Light. Co.
Nat'l Ry Appliance Co.
Smith Heater Co., Peter

**Heaters, Car, Hot Air and Water**
Elec. Service Sup. Co.
Smith Heater Co., Peter

**Helmets—Welding**
Railway Track-work Co.

**Hoists & Lifts**
Ford Chain Block Co.

**Hoists, Portable**
Ingersoll-Rand Co.
Sullivan Machinery Co.

**Hydraulic Machinery**
Allis-Chalmers Mfg Co

**Indicating Signals**
Oakel Equipment Co.

**Industrial Flooring**
Johns-Manville, Inc.

**Instruments, Measuring, Testing and Recording**
Elec. Service Sup. Co.
General Electric Co
Westinghouse E. & M. Co

**Insulating Cloth, Paper and Tape**
General Electric Co
Irvington Varnish & Ins. Co.
Johns-Manville, Inc.
Mica Insulator Co.
Mitchell-Rand Mfg. Co.
Okonite Co
Stand. Underground Cable Co.
Westinghouse E. & M. Co.

**Insulating Silk**
Irvington Varnish & Ins. Co.

**Insulating Varnishes**
Irvington Varnish & Ins Co

**Insulation (See also Paints)**
Electric Ry Equipment Co.
Electric Service Sup. Co.

# Pneumatic Tie Tampers



Labor aiding tools that enable a small gang to equal the work output of two to three times the same number of men working by hand. Pneumatic tampers also make a uniform, smooth and firm track that stands up twice as long as that tamped by hand.

Ask for actual performance reports on the savings made by pneumatic tamping methods and other labor-saving air tools in track work.

## INGERSOLL-RAND COMPANY

**11 Broadway, New York**

*Offices in all principal domestic and foreign cities*

**For Canada refer Canadian Ingersoll-Rand Company, Limited**
**260 St. James Street, Montreal, Quebec**

201-TT



Multiple Unit Control, double truck car for two-man operation.

## McGUIRE-CUMMINGS

***Manufacturing Company***

**General Offices**
**111 W. Monroe St., Chicago, Ill.**

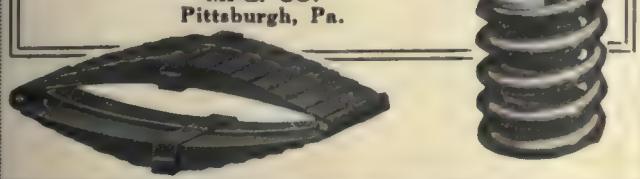
## Street Cars, Trucks Snow Sweepers

**Play for safety—**
***plus resiliency—***
***plus long life***

***By specifying***

## FORT PITT SPRINGS

**FORT PITT SPRING & MFG. CO.**
**Pittsburgh, Pa.**





## THORNTON

**The trolley wheel with the high mileage side bearing**

Thornton Wheels with Thornton side bearings are unusually long-lived, require less lubrication, and less maintenance. They are free from vibration and noiseless. No bushings. *Investigate them.*

Bearings make fifty thousand or more miles

***Send for descriptive circular***

**Thornton Trolley Wheel Co.,**
**Incorporated**
**Ashland, Kentucky**

**General Electric Co.**
**Irvington Varnish & Ins. Co.**
**Johns-Manville, Inc.**
**Mica Insulator Co.**
**Mitchell-Rand Mfg. Co.**
**Okonite Co.**
**Westinghouse E. & M. Co.**

**Insulation Slot**
**Irvington Varnish & Ins. Co.**

**Insulators (See also Line Material)**
**Elec. Ry. Equipment Co.**
**Elec. Service Supplies Co.**
**General Electric Co.**
**Hemingray Glass Co.**
**Irvington Varnish & Ins. Co.**
**Ohio Brass Co**
**Westinghouse E & M. Co**

**Insulator Pins**
**Elec. Service Supplies Co.**
**Hubbard & Co.**

**Insulators, High Voltage**
**Lapp Insulator Co., Inc.**

**Jacks (See also Cranes, Hoists and Lifts)**
**Elec. Service Supplies Co.**

**Joints, Rail (See Rail Joints)**

**Journal Boxes**
**Bemis Car Truck Co.**
**Brill Co., J. G.**
**St. Louis Car Co.**

**Junction Boxes**
**Std. Underground Cable Co.**

**Lamps, Guards and Fixtures**
**Elec. Service Sup. Co.**
**General Electric Co.**
**Westinghouse E. & M. Co.**

**Lamps, Arc & Incandescent (See also Headlights)**
**General Electric Co.**
**Westinghouse E. & M. Co.**

**Lamps, Signal and Marker**
**Nichols-Lintern Co.**

**Lanterns, Classification**
**Nichols-Lintern Co.**

**Lightning Protection**
**Elec. Service Sup. Co.**
**General Electric Co.**
**Ohio Brass Co.**
**Shaw, Henry M.**
**Westinghouse E. & M. Co.**

**Line Material (See also Brackets, Insulators, Wires, etc.)**
**Archbold-Brady Co.**
**Columbia M. W. & M. I. Co.**
**Electric Ry Equipment Co.**
**Elec Service Sup. Co.**
**Hubbard & Co.**
**Johns-Manville, Inc.**
**More-Jones Brass & Metal Co.**
**Ohio Brass Co.**
**Westinghouse E. & M. Co.**

**Locomotives, Electric**
**General Electric Co.**
**McGuire-Cummings Mfg. Co.**
**St. Louis Car Co.**
**Westinghouse E. & M. Co.**

**Locomotives, Oil Engine, Electric Driven**
**Ingersoll-Rand Co.**

**Lubricating Engineers**
**Galena Signal Oil Co.**
**Standard Oil Co. of Ind.**
**Universal Lubricating Co.**

**Lubricants, Oil and Grease**
**Galena-Signal Oil Co.**
**Standard Oil Co. of Ind.**
**Universal Lubricating Co.**

**Machinery, Insulating**
**Amer. Insulating Mach. Co.**

**Manganese Steel Guard Rails**
**Ramapo Ajax Corp.**

**Manganese Steel Switches, Frogs & Crossings**
**Bethlehem Steel Co.**
**Ramapo Ajax Corp.**

**Manganese Steel, Special Track Work**
**Bethlehem Steel Co.**

**Meters (See Instruments)**

**Mica**
**Mica Insulator Co.**

**Molding, Metal**
**Allis-Chalmers Mfg. Co.**

**Motor Buses (See Buses, Motor)**

**Motors, Electric**
**Westinghouse E. & M. Co.**

**Motors and Generator Sets**
**General Electric Co.**

**Motormen's Seats**
**Allis-Chalmers Mfg. Co.**
**Brill Co., J. G.**
**Elec. Service Sup. Co.**
**Hale-Kilburn Co.**
**Heywood-Wakefield Co.**
**St. Louis Car Co.**
**Wood Co., Chas. N.**

**Nuts and Bolts**
**Barbour-Stockwell Co.**
**Bethlehem Steel Co.**
**Bemis Car Truck Co.**
**Hubbard & Co**

**Oils (See Lubricants)**

**Omnibuses (See Buses, Motor)**

**Oxy-Acetylene (See Cutting Apparatus Oxy-Acetylene)**

**Oxygen**
**International Oxygen Co.**

**Packing**
**Johns-Manville, Inc.**

**Paints and Varnishes (Insulating)**
**Mica Insulator Co**
**Mitchell-Rand Mfg. Co.**
**National Ry. Appliance Co.**

**Pavement Breakers**
**Ingersoll-Rand Co.**
**Sullivan Machinery Co.**

**Paving Material**
**Amer. Br. Shoe & Fdy. Co.**

**Pickups, Trolley Wire**
**Elec. Service Supplies Co.**
**Ohio Brass Co.**

**Pinion Pullers**
**Elec. Service Supplies Co.**
**General Electric Co.**
**Wood Co., Chas. N.**

**Pinions (See Gears)**

**Pins, Case Hardened, Wood and Iron**
**Bemis Car Truck Co.**
**Elec. Service Sup. Co.**
**Ohio Brass Co.**
**Westinghouse Tr. Brake Co.**

**Pins, Wood & Iron**
**Sharp, Ew. P.**

**Pipe Fittings**
**Standard Steel Wks**
**Westinghouse Tr. Brake Co.**

**Planers (See Machine Tools)**

**Plates for Tee Rail Switches**
**Ramapo Ajax Corp.**

**Pliers, Rubber Insulated**
**Elec. Service Sup. Co.**

**Pneumatic Tools**
**Ingersoll-Rand Co.**

**Pole Line Hardware**
**Bethlehem Steel Co.**
**Ohio Brass Co.**

**Poles, Metal Street**
**Bates Expanded Steel Truss Co.**
**Elec. Ry. Equipment Co.**
**Hubbard & Co.**

**Pole Reinforcing**
**Hubbard & Co.**

**Poles & Ties Treated**
**Bell Lumber Co.**

**Poles, Ties, Posts, Piling & Lumber**
**Bell Lumber Co.**

**Poles, Trolley**
**Anderson Mfg. Co., A. & J. M.**
**Elec. Service Supplies Co.**
**Nuttall Co., R. D.**

**Poles, Tubular Steel**
**Elec. Ry. Equipment Co.**
**Elec. Service Sup. Co.**

**Porcelain, Special High Voltage**
**Lapp Insulator Co., Inc.**

**Potheads**
**Okonite Co.**

**Power Saving Devices**
**National Ry. Appliance Co.**

**Pressure Regulators**
**General Electric Co.**
**Westinghouse E. & M. Co.**

**Pumps**
**Allis-Chalmers Mfg. Co.**
**Ingersoll-Rand Co.**

**Pumps, Air Lift**
**Sullivan Machinery Co.**

**Pumps, Vacuum**
**Ingersoll-Rand Co.**
**Sullivan Machinery Co.**

**Punches, Ticket**
**Bonney-Vehslage Tool Co.**
**Intern'l Register Co., The**
**Wood Co., Chas. N.**

**Rail Braces & Fastenings**
**Ramapo Ajax Corp.**

**Rail Filler**
**Carey Co., Philip**

**Rail Grinders (See Grinders)**

**Rail Joints**
**Carnegie Steel Co.**
**Rail Joint Co.**

**Rail Joints—Welded**
**Lorain Steel Co.**

**Rails Relaying**
**L. B. Foster Co.**
**Hyman-Michaels Co.**

**Rails, Steel**
**Bethlehem Steel Co.**
**L. B. Foster Co.**
**Carnegie Steel Co.**

**Railway Paving Guards, Steel**
**Godwin Co., Inc., W. S.**

**Railway Safety Switches**
**Westinghouse E. & M. Co.**

**Rail Welding**
**Railway Track-work Co.**
**Rail Welding & Bonding Co.**

**Rattan**
**Brill Co., The J. G.**
**Elec. Service Supplies Co.**
**Hale-Kilburn Co.**
**Heywood-Wakefield Co.**
**McGuire-Cummings Mfg. Co**
**St. Louis Car Co.**

**Registers and Fittings**
**Brill Co., The J. G.**
**Elec. Service Supplies Co.**
**Intern'l Register Co., The**
**Rooke Automatic Register Co**
**St. Louis Car Co.**

**Reinforcement, Concrete**
**Amer. Steel & Wire Co.**

**Repair Shop Appliances (See also Coil Banding and Winding Machines)**
**Elec. Service Supplies Co.**

**Repair Work (See also Coils)**
**General Electric Co.**
**Westinghouse E. & M. Co.**

**Replacers, Car**
**Elec. Service Sup. Co.**

**Resistance, Wire and Tube**
**General Electric Co.**
**Westinghouse E. & M. Co.**

**Retrievers, Trolley (See Catchers and Retrievers, Trolley)**

**Rheostats**
**General Electric Co.**
**Mica Insulator Co.**
**Westinghouse E. & M. Co.**

**Roofing Asbestos (Car)**
**Johns-Manville, Inc.**

**Roofs**
**Haskelite Mfg. Co.**

**Sanders, Track**
**Brill Co. The J. G.**
**Elec. Service Supplies Co.**
**Nichols-Lintern Co.**
**Ohio Brass Co.**
**St. Louis Car Co.**

**Sash Fixtures, Car**
**Brill Co. The J. G.**
**St. Louis Car Co.**

**Sash, Metal, Car Window**
**Hale-Kilburn Co.**

**Scrapers, Track (See Cleaners and Scrapers, Track)**

**Screw Drivers, Rubber Insulated**
**Elec. Service Sup. Co.**

**Seats, Bus**
**Hale-Kilburn Co.**
**Heywood-Wakefield Co.**
**St. Louis Car Co.**

**Seats, Car (See also Rattan)**
**Brill Co., The J. G.**
**Hale-Kilburn Co.**
**Heywood-Wakefield Co.**
**St. Louis Car Co.**

**Seating Materials**
**Brill Co., J. G.**
**Heywood-Wakefield Co.**
**St. Louis Car Co.**

**Second Hand Equipment**
**Electric Equipment Co.**
**Hyman-Michaels Co.**
**Transit Equip. Co.**

**Shades, Vestibule**
**Brill Co., The J. G.**

**Shovels**
**Allis-Chalmers Mfg. Co.**
**Brill Co., The J. G.**
**Hubbard & Co.**

**Side Bearings (See Bearings Center and Side)**

**Signals, Car Starting**
**Elec. Service Sup. Co.**
**Nat'l Pneumatic Co., Inc.**

**Signals, Indicating**
**Nichols-Lintern Co.**
**Oakel Equipment Co.**

**Signal Systems, Block**
**Elec. Service Sup. Co.**
**Nachod Signal Co., Inc.**
**U. S. Electric Signal Co.**
**Wood Co., Chas. N.**

**Signal Systems, Highway Crossing**
**Nachod Signal Co., Inc.**
**U. S. Electric Signal Co.**

**Slack Adjusters (See Brake Adjusters)**

**Sleet Wheels and Cutters**
**Anderson Mfg. Co., A. & J. M.**
**Elec. Ry. Equipment Co.**
**Elec. Service Supplies Co.**
**More-Jones Brass & Metal Co.**
**Nuttall Co., R. D.**

**Smokestacks, Car**
**Nichols-Lintern Co.**

**Snow Sweepers, Rattan**
**Heywood-Wakefield Co.**

**Snow-Plows, Sweepers and Brooms**
**Brill Co., The J. G.**
**Consolidated Car Fender Co.**
**McGuire-Cummings Mfg. Co.**
**St. Louis Car Co.**

**Sockets and Receptacles**
**Johns-Manville, Inc.**

**Soldering and Brazing Apparatus (See Welding Processes and Apparatus)**

**Special Adhesive Papers**
**Irvington Varnish & Ins. Co.**

**Special Trackwork**
**Bethlehem Steel Co.**
**Buda Company**
**Lorain Steel Co.**

**Spikes**
**Amer. Steel & Wire Co.**

**Splicing Compounds**
**Westinghouse E. & M. Co.**

**Splicing Sleeves (See Clamps and Connectors)**

**Springs, Car and Truck**
**Amer. Steel & Wire Co.**
**American Steel Foundries**
**Bemis Car Truck Co.**
**Brill Co., The J. G.**
**Fort Pitt Spring & Mfg. Co.**
**St. Louis Car Co.**
**Standard Steel Works**

**Sprinklers, Track and Road**
**Brill Co., The J. G.**
**McGuire-Cummings Mfg. Co.**
**St. Louis Car Co.**

**Stair Steps, Safety**
**Irving Iron Works**

**Steel and Steel Products**
**Morton Mfg. Co.**

**Steps, Car**
**Morton Mfg. Co.**

**Stokers, Mechanical**
**Babcock & Wilcox Co.**
**Westinghouse E. & M. Co.**

**Stop Signals**
**Oakel Equipment Co.**

**Storage Batteries (See Batteries, Storage)**

**Strain, Insulators**
**Anderson Mfg. Co., A. & J. M.**
**Ohio Brass Co.**

**Strand**
**Roebling's Sons Co., J. A.**

**Subway Boxes**
**Johns-Pratt Co.**

**Superheaters**
**Babcock & Wilcox Co.**

**Sweepers, Snow (See Snow Plows, Sweepers and Brooms)**

**Switchboxes**
**Johns-Manville, Inc.**

**Switch Stands & Fixtures**
**Ramapo Ajax Corp.**

**Switches, Safety**
**Johns-Pratt Co.**

**Switches, Selector**
**Nichols-Lintern Co.**

**Switches, Tee Rail**
**Ramapo Ajax Corp.**

**Switches, Track (See Track Special Work)**

**Switches and Switchboards**
**Allis-Chalmers Mfg Co.**
**Elec. Service Supplies Co.**
**General Electric Co.**
**Westinghouse E. & M. Co.**

**Tampers, Tie**
**Ingersoll-Rand Co.**
**Railway Track-work Co.**

**Tapes and Cloths (See Insulating Cloth, Paper and Tape)**

**Tee Rail Special Track Work**
**Bethlehem Steel Co**
**Ramapo Ajax Corp.**

**Telephones and Parts**
**Elec. Service Supplies Co.**

**Terminals, Cable**
**Std. Underground Cable Co.**

**Testing Devices, Meter**
**Johns-Pratt Co.**

**Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)**

**Thermostats**
**Gold Car Heating & Lighting Co.**
**Railway Utility Co.**
**Smith Heater Co., Peter**

**Ticket Choppers & Destroyers**
**Elec. Service Supplies Co.**

**Ties, All Metal**
**Metal Safety R.R. Tie Co.**

**Ties and Tie Rods, Steel**
**Barbour-Stockwell Co.**
**Carnegie Steel Co.**
**International Steel Tie Co.**

**Ties, Wood Cross (See Poles, Ties, Posts, etc.)**

**Tool Steel**
**Bethlehem Steel Co.**

**Tools, Track & Miscellaneous**
**Amer. Steel & Wire Co.**
**Elec. Service Supplies Co.**
**Hubbard & Co**
**Railway Track-work Co.**

**Torches, Acetylene (See Cutting Apparatus)**

**Tower Wagons and Auto Trucks**
**McCardell & Co., J. R.**

**Towers and Transmission Structures**
**Archbold Brady Co**
**Bates Expanded Steel Truss Co**
**Westinghouse E. & M. Co.**

**Track Grinders**
**Railway Track-work Co.**
**Rail Welding & Bonding Co**

**Trackless Trolley Cars**
**St. Louis Car Co**

**Track, Special Work**
**Barbour-Stockwell Co.**
**Bethlehem Steel Co.**
**Ramapo Ajax Corp.**
**Wharton, Jr., & Co., Inc., W.**

**Transfer (See Tickets)**

**Transformers**
**Allis-Chalmers Mfg. Co.**
**General Electric Co.**
**Westinghouse E. & M. Co.**

**Treads, Safety, Stair, Car Step**
**Morton Mfg. Co.**

**Trolley Bases**
**Anderson Mfg. Co., A. J. & J. M.**
**Elec. Service Supplies Co.**
**General Electric Co.**
**More-Jones Brass & Metal Co.**
**Nuttall Co., R. D.**
**Ohio Brass Co.**

**Trolley Bases, Retrieving**
**Anderson Mfg. Co., A. & J. M.**
**Elec. Service Supplies Co.**
**Nuttall Co., R. D.**
**Ohio Brass Co.**

**Trolley Buses**
**Brill Co., The J. G.**
**General Electric Co.**
**Westinghouse E. & M. Co.**

**Trolley Material (Overhead)**
**Bates Expanded Steel Twist**
**Anderson Mfg. Co., A. & J. M**
**Elec. Service Supplies Co.**
**More-Jones Brass & Metal Co.**
**Ohio Brass Co.**

**Trolleys & Trolley System**
**Ford Chain Block Co.**

**Trolley Wheels (See Wheels, Trolley)**

**Trolley Wheel Bushings**
**More-Jones Brass & Metal Co**

**Trolley Wheels & Harps**
**More-Jones Brass & Metal Co.**
**Thornton Trolley Wheel Co.**

**Trolley Wire**
**Amer. Electrical Works**
**Amer. Steel & Wire Co.**
**Anaconda Copper Min. Co.**
**Page Steel & Wire Co.**
**Roebling's Sons Co., J. A.**

**Trucks, Car**
**Bemis Car Truck Co.**
**Brill Co., The J. G.**
**McGuire-Cummings Mfg. Co.**
**St. Louis Car Co**

**Tubing, Yellow & Black, Flexible Varnish**
**Irvington Varnish & Ins. Co.**

**Turbines, Steam**
**Allis-Chalmers Mfg. Co.**
**General Electric Co.**
**Westinghouse E. & M. Co.**

**Turnstiles**
**Elec. Service Supplies Co.**
**Perey Mfg. Co., Inc.**

**Valves**
**Ohio Brass Co.**
**Westinghouse Tr. Br. Co.**

**Varnished Papers**
**Irvington Varnish & Ins. Co.**

**Varnished Silks**
**Irvington Varnish & Ins. Co.**

**Varnishes**
**Beckwith-Chandler Co.**

**Ventilators, Car**
**Brill Co., The J. G.**
**Nat'l Ry. Appliance Co.**
**Nichols-Lintern Co**
**Railway Utility Co.**
**St. Louis Car Co.**

**Vestibule Linings**
**Haskelite Mfg Co.**

**Welded Rail Joints**
**Alumino-Thermic Corp.**
**Electric Railway Impt. Co**
**Ohio Brass Co.**
**Railway Track-work Co.**
**Rail Welding & Bonding Co**

**Welders, Portable Electric**
**Electric Railway Impt. Co**
**Ohio Brass Co.**
**Railway Track-work Co.**
**Rail Welding & Bonding Co**

**Welding & Cutting Tools**
**International Oxygen Co.**

**Welding Processes and Apparatus**
**Alumino-Thermic Corp.**
**General Electric Co**
**Electric Railway Impt Co**
**International Oxygen Co.**
**Ohio Brass Co**
**Railway Track-work Co**
**Rail Welding & Bonding Co**
**Westinghouse E. & M. Co.**

**Welding Steel**
**Electric Railway Impt. Co.**
**Railway Track-work Co**
**Rail Welding & Bonding Co**

**Welding Wire & Rods**
**Page Steel & Wire Co**

**Wheel Guards (See Fenders and Wheel Guards)**

**Wheel Presses (See Machine Tools)**

**Wheels, Car, Cast Iron**
**Griffin Wheel Co.**

**Wheels, Car Steel & Steel Tire**
**American Steel Foundries**
**Carnegie Steel Co**
**Standard Steel Works**

**Wheels, Trolley**
**Elec. Ry. Equipment Co.**
**Gilbert & Sons, E. P. A.**
**Sharp, Edw. P.**

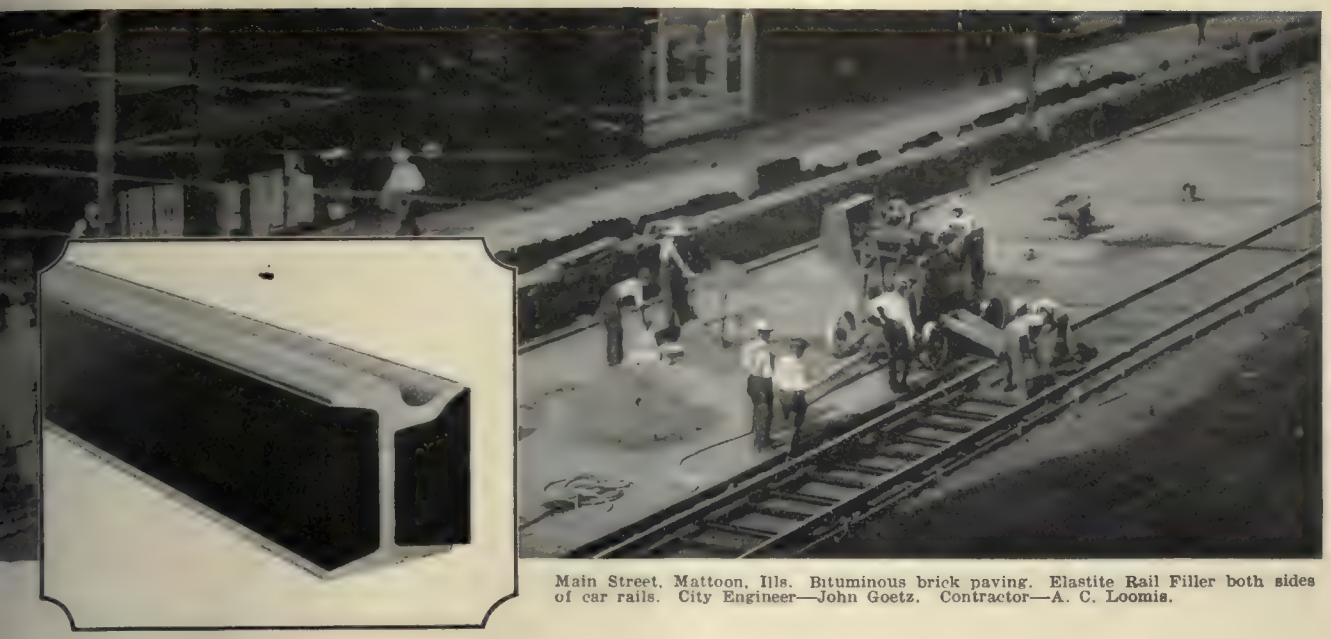
**Wheels, Trolley, Wrought Steel**
**Elec. Service Supplies Co**
**General Electric Co.**
**Nuttall Co., R. D.**

**Whistles, Air**
**General Electric Co.**
**Ohio Brass Co**
**Westinghouse E. & M. Co**

**Wire, Copper Covered, Steel**
**Page Steel & Wire Co**

**Wire Rope**
**Amer Steel & Wire Co**
**Roebling's Sons Co., J A.**

**Wires and Cables**
**Amer. Electrical Works**
**Amer. Steel & Wire Co**
**Anaconda Copper Min Co**
**General Electric Co**
**Kerite Insulated Wire & Cable Co**
**Okonite Co**
**Page Steel & Wire Co**
**Roebling's Sons Co., J. A**
**Std. Underground Cable Co.**
**Westinghouse E. & M Co**



Main Street, Mattoon, Ills. Bituminous brick paving. Elastite Rail Filler both sides of car rails. City Engineer—John Goetz. Contractor—A. C. Loomis.

# This is the way to reduce track repair costs

The principal causes of paving deterioration along car rails are *vibration and impact.* Secondly—*water seepage* and *frost-action.*

Carey Elastite Rail Filler absorbs this destructive vibration and cushions the paving against traffic shocks. It maintains a close water-tight joint and keeps water and frost out. It reduces traffic noise to a minimum.

Years of service in extensive installations show conclusively the great savings in repair costs effected by Elastite Rail Filler. It does not wear out and never needs replacement. It saves upkeep costs and lengthens the life of trackage investment.

Supplied to fit any weight or contour of rail. Write for literature. Send exact sketch of rail size and contour and state lineal feet required in writing for prices.

THE PHILIP CAREY COMPANY
53 Wayne Ave., Lockland, Cincinnati, O.

## Elastite Rail Filler Is Easy to Install

**a tap of a mallet holds it in the web of the rail.**

Carey Elastite Rail Filler is a composition of specially-tempered asphalt and fibre which is used as a resilient cushion between the rail and the pavement, absorbing traffic-impact, rail vibration, and traffic-noise. It is preformed to fit any rail-section and is readily shaped on the job to fit any track-curve. It is unaffected by moisture or temperature changes and is enduring under all service conditions.

Carey Elastite

Reg. U.S. Patent Office

# RAIL FILLER

# ALPHABETICAL INDEX TO ADVERTISEMENTS


A

| | Page |
|---|---|
| Allis-Chalmers Mfg. Co. | 44 |
| Allison & Co., J. E. | 20 |
| Alumino-Thermic Corp. | 45 |
| Amer. Brake Shoe & Fdy. Co. | 47 |
| American Car Co. | 55 |
| American Electrical Works | 42 |
| American Insulating Mach. Co. | 42 |
| American Steel Foundries | 30 |
| American Steel & Wire Co. | 43 |
| Anaconda Copper Mining Co. | 42 |
| Anderson Mfg. Co., A. & J. M. | 37 |
| Archbold-Brady Co. | 21 |
| Atlas Lumnite Cement Co. | 23 |

B

| | |
|---|---|
| Babcock & Wilcox Co. | 44 |
| Barbour-Stockwell Co. | 44 |
| Bates Expanded Steel Truss Co. | 8 |
| Beckwith-Chandler Co. | 28 |
| Beeler, John A. | 20 |
| Bell Lumber Co. | 54 |
| Bemis Car Truck Co. | 46 |
| Bethlehem Steel Co. | 31 |
| Bonney-Vehslage Tool Co. | 46 |
| Brill Co., The J. G. | 55 |
| Buchanan & Layng Corporation. | 21 |
| Bureau of Com. Economics, Inc. | 21 |
| Byllesby Co., H. M. | 20 |

C

| | |
|---|---|
| Cameron Electrical Mfg. Co. | 44 |
| Carey Co., Philip | 53 |
| Carnegie Steel Co. | 45 |
| Chillingworth Mfg. Co. | 54 |
| Cleveland Fare Box Co. | 46 |
| Collier, Inc., Barron G. | 22 |
| Consolidated Car Fender Co. | 48 |
| Consolidated Car Heating Co. | 29 |
| Cyclone Fence Co. | 6 |

D

| | |
|---|---|
| Dayton Mech. Tie Co. | 24-25 |
| Day & Zimmermann, Inc. | 20 |
| Differential Steel Car Co., The | 48 |
| Drum & Co., A. L. | 21 |

E

| | |
|---|---|
| Earll, C. I. | 48 |
| Electric Equipment Co. | 49 |
| Electric Railway Equipment Co. | 10 |
| Electric Railway Improvement Co. | 44 |
| Electric Service Supplies Co. | 9 |

F

| | |
|---|---|
| Flower, D. B. | 47 |
| Ford, Bacon & Davis | 20 |
| Ford Chain Block Co. | 45 |
| "For Sale" Ads. | 48 |
| Fort Pitt Spring & Mfg. Co. | 51 |
| Foster Co., L. B. | 44, 49 |

G

| | |
|---|---|
| Galena-Signal Oil Co. | 17 |
| General Electric Co. | 18, Back Cover |
| Gold Car Heating & Ltg. Co. | 46 |
| Griffin Wheel Co. | 47 |

H

| | |
|---|---|
| Hale-Kilburn Co. | 46 |
| Haskelite Mfg. Co. | 21 |
| "Help Wanted" Ads. | 49 |
| Hemingray Glass Co. | 42 |
| Hemphill & Wells | 20 |
| Heywood Wakefield Co. | 39 |
| Holst Englehardt W. | 20 |
| Hubbard & Co. | 42 |
| Hyman-Michaels Co. | 49 |

I

| | |
|---|---|
| Industrial Works | 41 |
| Ingersoll-Rand Co. | 51 |
| International Motor Co. | 14-15 |
| International Oxygen Co. | 45 |
| International Register Co., The | 46 |
| International Steel Tie Co. | 7 |
| Irving Iron Works | 38 |
| Irvington Varnish & Insulator Co. | 37 |

J

| | |
|---|---|
| Jackson, Walter | 20 |
| Jeandron, W. J. | 47 |
| Johnson & Co., J. B. | 54 |
| Johnson Fare Box Co. | Front Cover |
| Johns-Manville, Inc. | 36 |
| Johns-Pratt Co. | 43 |

K

| | |
|---|---|
| Kerite Insulated Wire & Cable Co. | 43 |
| Kuhlman Car Co. | 55 |

L

| | |
|---|---|
| Laclede Steel Co. | 33 |
| Lapp Insulator Co., Inc. | 42 |
| Le Carbone Co. | 47 |
| Lorain Steel Co. | 44 |

M

| | |
|---|---|
| McCardell Co., J. R. | 43 |
| McGuire-Cummings Mfg. Co. | 51 |
| Mica Insulator Co. | 45 |
| Mitchell-Rand Mfg. Co. | 36 |
| More-Jones Brass & Metal Co. | 35 |
| Morton Mfg. Co. | 54 |

N

| | |
|---|---|
| Nachod Signal Co., Inc. | 42 |
| National Brake Co. | 19 |
| National Pneumatic Co., Inc. | 11 |
| National Railway Appliance Co. | 45 |
| Nichols-Lintern Co. | 46 |
| Nuttall Co., R. D. | 38 |

O

| | |
|---|---|
| Ohio Brass Co. | 5 |
| Okonite Co., The | 45 |
| Ong, Joe R. | 21 |
| Oskel Equipment Co. | 54 |

P

| | |
|---|---|
| Page Steel & Wire Co. | 43 |
| Panelyte Co. | 48 |
| Perey Mfg. Co., Inc. | 46 |
| Petry Co., Inc., F. A. | 40 |
| Positions Wanted and Vacant | 49 |

R

| | |
|---|---|
| Railway Audit & Inspection Co. | 20 |
| Railway Track-work Co. | 4 |
| Railway Utility Co. | |
| Rail Welding & Bonding Co. | |
| Ramapo Ajax Co. | |
| Richey, Albert S. | |
| Robinson Co., Dwight P. | |
| Roebling's Sons Co., John A. | |
| Rooke Automatic Register Co. | |

S

| | |
|---|---|
| St. Louis Car Co. | |
| Safety Car Devices Co. | |
| Samson Cordage Works | |
| Sanderson & Porter | |
| Searchlight Section | |
| Sharp, Edw. P. | |
| Shaw, Henry M. | |
| Six Wheel Co. | |
| Smith Heater Co., Peter | |
| Standard Oil Co. | |
| Standard Steel Works | |
| Standard Underground Cable Co. | |
| Star Brass Works | |
| Stevens & Wood, Inc. | |
| Stone & Webster | |
| Stucki Co., A. | |
| Sullivan Machinery Co. | |

T

| | |
|---|---|
| Thornton Trolley Wheel Co. | |
| Tool Steel Gear & Pinion Co., The | |
| Transit Equip Co. | |

U

| | |
|---|---|
| Universal Lubricating Co. | |
| U. S Electric Signal Co. | |

W

| | |
|---|---|
| "Want" Ads. | |
| Wason Mfg. Co. | |
| Westinghouse Electric & Mfg. Co. | |
| Westinghouse Traction Brake Co. | |
| White Engineering Corp., J. G. | |
| Wish Service, The P. Edw. | |
| Wood Co., Chas. N. | |



100 New Users in the Last Nine Months
KASS SAFETY TREADS
HIGH
in efficiency and lasting qualities
LOW
in weight, initial and upkeep costs
Morton Manufacturing Co., Chicago



STUCKI SIDE BEARINGS
A. STUCKI CO.
Oliver Bldg.
Pittsburgh, Pa.



CHILLINGWORTH
One-Piece Gear Cases
Seamless—Rivetless—Light Weight
Best for Service—Durability and Economy. *Write Us.*
Chillingworth Mfg. Co.
Jersey City, N. J.

"Axle Specialists Since 1866"
Address all Mail to Post Office Box 515, Richmond, Va.
CAR AXLES
J. R. JOHNSON AND CO., INC.
FORGED STEEL AXLES
For Locomotives, Passenger, Freight and Electric Cars
Smooth Forged or Rough Turned—Carbon or Alloy Steel—Plain or Heat Treated, Forged and Turned Piston Rods, Crank Pins, Large Shafts, Round Bars, etc.

Northern CEDAR POLES Western
We guarantee
all grades of poles; also any butt-treating specifications
BELL LUMBER COMPANY
Minneapolis, Minn.




"OSKELITE"
The Stop Light for street cars. Operates from brake system. Details on request.
The Oskel Equipment Co.
940 McCormick Bldg., Chicago, Ill.

# And now the Steel Coach—



# Kuhlman Interboro Steel Coach

A glance at the above illustration is proof that, while this new development is also of steel, affording greater passenger protection in collisions, maximum passenger comfort has also been well provided for. You can have no better salesmen for your transportation line than this combination of safety and comfort.

It seats 26 passengers. May we tell you more about it?



THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

AMERICAN CAR CO. — ST. LOUIS MO. — G.C. KUHLMAN CAR CO. CLEVELAND, OHIO. — WASON MANF'G CO. SPRINGFIELD, MASS.

MEMBER ELECTRIC RAILWAY MANUFACTURERS ASSOCIATION AERA




ey bus
tenance is
ifferent from
naintenance
and is done
he regular
organization

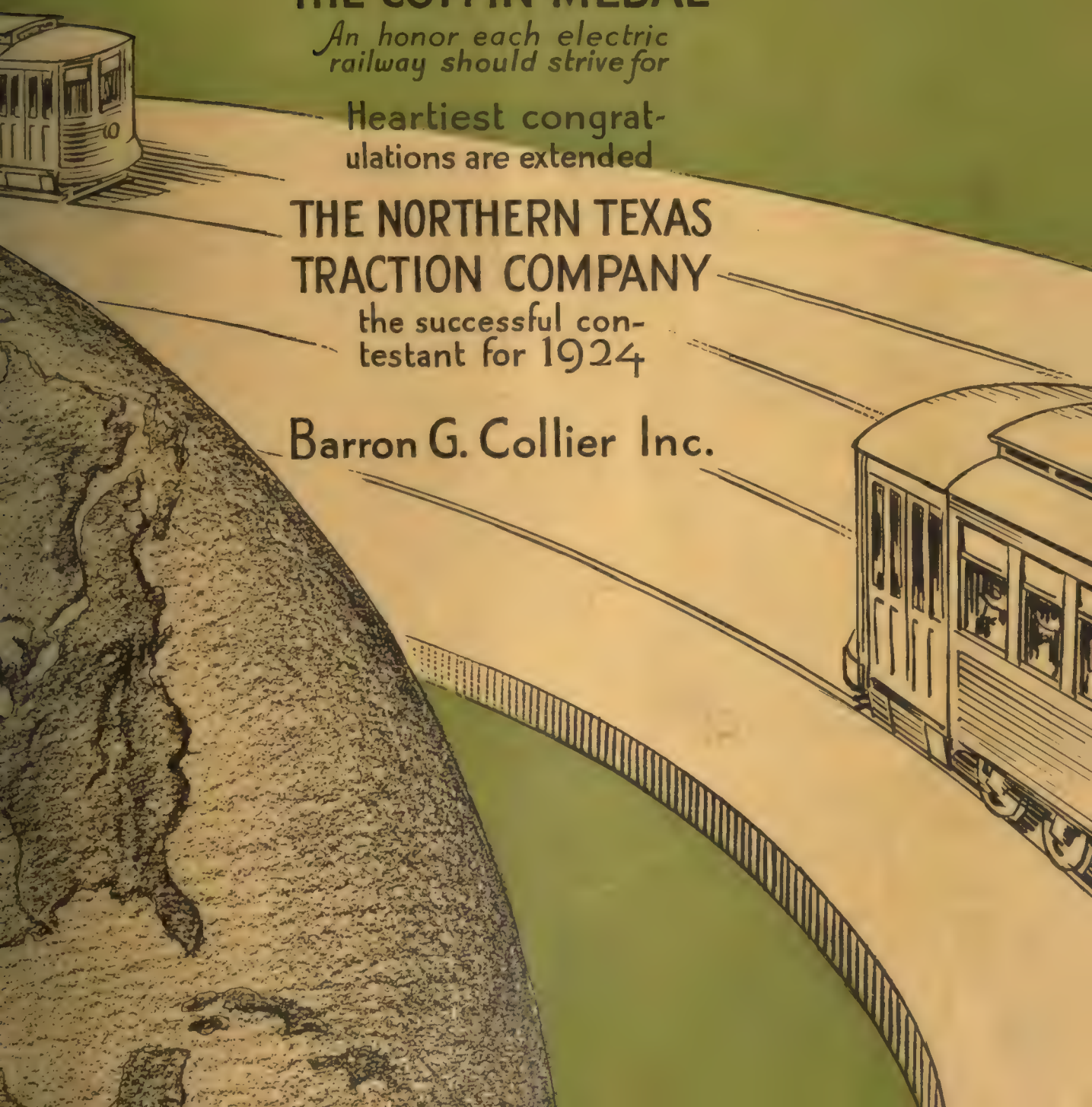
4 TROLLEY BUSES equipped with GE-264 Motors and G-E Control are operated by the Virginia Railway & Power Company, Petersburg. Their close similarity to the trolley car makes them a desirable addition to the railway property, particularly from the maintenance standpoint. Have you considered the trolley bus for supplementing your present service?

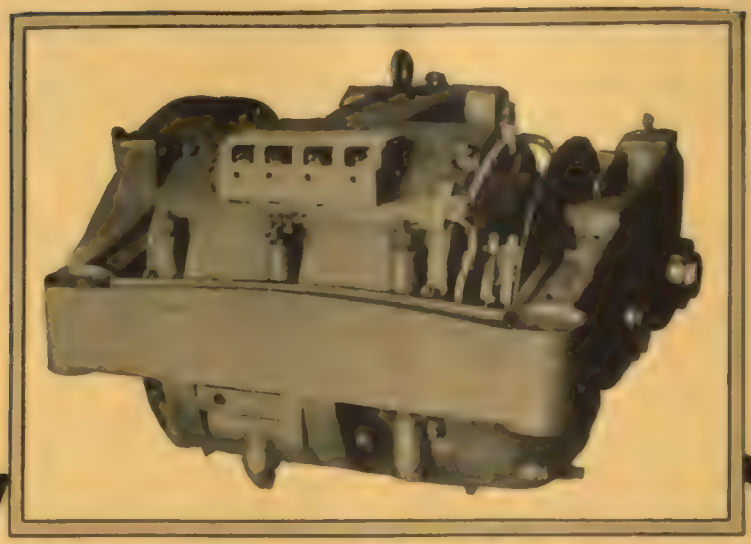
**General Electric Company**
**Schenectady, N. Y.**
Sales Offices in all Large Cities

25-033

raw-Hill Company, Inc. November 22, 1924 Twenty Cents Per Copy

# ELECTRIC RAILWAY JOURNAL





Westinghouse No. 3 Railway Motor

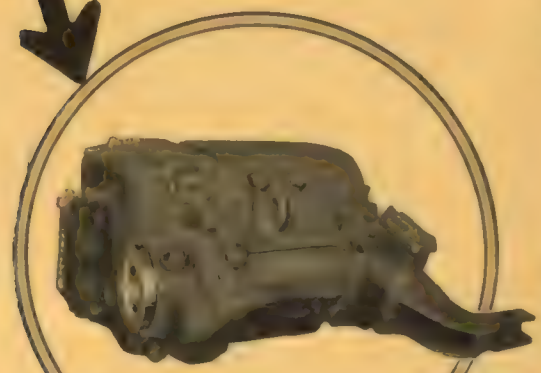
# 2500 Miles Per Month For Thirty Three Years!

RELIABILITY, Low Maintenance and Long Life are personified in the Westinghouse No. 3 Railway Motor, removed from service for exhibition at the A. E. R. A. Convention recently held at Atlantic City. This motor, built thirty-three years ago, has run over a million miles.

## Westinghouse Railway Motors

represent the best of thirty-three years operating and manufacturing experience. They are better today than ever.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of the United States and Foreign Countries



Westinghouse No. 510, 35 HP., 600-volt Railway Motor. The up-to-date successor of No. 3.
Complete specifications upon request.

WESTINGHOUSE ELECTRIC

# Westinghouse

*Vol. 64, No. 21* New York, November 22, 1924 *Pages* 869-906

# ELECTRIC RAILWAY JOURNAL

MORRIS BUCK
Associate Editor
C. W. SQUIER
Associate Editor
JOHN A. MILLER, JR.
Assistant Editor
G. J. MACMURRAY
News Editor

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

CHARLES GORDON
Western Editor
Old Colony Bldg., Chicago
MERRILL B. KNOX
Editorial Assistant
Old Colony Bldg., Chicago
CARL W. STOCKS
Associate Editor

## CONTENTS

**Editorials** ..... 869

**Everett Shops of Boston "L" Pave Way to Maintenance Economies—I** ..... 871
The new layout, which provides for all equipment repairs except for the Cambridge subway, was decided on after careful survey of requirements. Growth of the system dictated concentration of facilities for rolling stock maintenance. Comprehensive provision for mechanical and electrical services.

**Storeroom Improvements at Richmond Save Time and Money** ..... 875
By JOHN Y. BAYLISS.
Stock has been completely rearranged and new cases provided. Heavy material is kept on raised platforms. Lift trucks save much time. Cost of installing new system was $5,400.

**D. U. R. to Operate Co-ordinated Rail-Bus System** ..... 879
Bus lines now paralleling interurban system will be co-ordinated with rail service to give alternate bus and electric car service on frequent headway.

**Accident Costs Reduced 1.56 per Cent of Gross Earnings** ..... 880

**Transportation Service Co-ordinated in Southeastern Pennsylvania** ..... 881
The acquisition of 11 bus lines and 8 miles of rail route has enabled the West Chester Street Railway greatly to extend its operations and population contact. The company has been relieved of paving obligations. Railway is the backbone of the bus development.

**Association News and Discussions** ..... 885

**Iowa Association Discusses Maintenance** ..... 885
Track construction, automatic substations, bus operation, equipment maintenance, electric welding and lubrication furnish subjects for fall program and lively discussion.

**Maintaining Street Railway Track** ..... 887
By M. W. FREUND.

**Experience with Automatic Substations** ..... 888
By D. H. NAIL.

**Public Relations Discussed at West Virginia Convention** ..... 889
Water power and regulation were other topics at a two-day meeting of the West Virginia Public Utilities Association, held at Charleston last week.

**American Association News** ..... 891

**Maintenance of Equipment** ..... 892

**News of the Industry** ..... 895

**McGraw-Hill Company, Inc., Tenth Ave. at 36th St., New York**

JAMES H. MCGRAW, President
ARTHUR J. BALDWIN, Vice-President
MALCOLM MUIR, Vice-President
C. J. MELDEN, Vice-President
MASON BRITTON, Vice-President
JAMES H. MCGRAW, JR., Vice-Pres. and Treas.
H. THOMPSON, Secretary

WASHINGTON: Colorado Building
CHICAGO: Old Colony Building
PHILADELPHIA: Real Estate Trust Building
CLEVELAND: Leader-News Building
ST. LOUIS: Star Building
SAN FRANCISCO: 883 Mission Street
LONDON: 6 Bouverie Street, London, E. C. 4

Member Associated Business Papers, Inc.
Member Audit Bureau of Circulations

1924

Cable Address: "Machinist, N. Y."
Publishers of
*Engineering News-Record*
*American Machinist*
*Power*
*Chemical and Metallurgical Engineering*
*Coal Age*
*Engineering and Mining Journal-Press*
*Ingeniería Internacional*
*Bus Transportation*
*Electric Railway Journal*
*Electrical World*
*Electrical Merchandising*
*Journal of Electricity (Published in San Francisco)*
*Industrial Engineer (Published in Chicago)*
*Electrical Retailing (Published in Chicago)*
*American Machinist—European Edition (Published in London)*

The annual subscription rate is $4 in the United States, Canada, Mexico, Alaska, Hawaii, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, Colombia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brazil, Spain, Uruguay, Costa Rica, Ecuador, Guatemala and Paraguay. Extra foreign postage to other countries $3 (total $7 or 29 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid to any part of the world, 20 cents.

Change of Address—When change of address is ordered the new and the old address must be given, notice to be received at least ten days before the change takes place.

Copyright, 1924, by McGraw-Hill Company, Inc.

Published weekly. Entered as second-class matter, June 23, 1908, at the Post Office, at New York, under the Act of March 3, 1879. Printed in U.S.A.

## *"What Are the Facts?"*

SO READS the placard which the head of one of the largest industrial organizations in the United States has had placed on the wall behind his desk, where its message will greet the incoming visitor. The phrase is a good one to be kept in mind by others as well as business executives. It expresses a policy of particular importance in the publication of technical magazines. This thought is never lost sight of by the editors of the ELECTRIC RAILWAY JOURNAL.

Fiction and fancy have their places. Indeed, it would be a dull world that was composed entirely of facts and figures. But the place of fiction is not in this paper. Here, we believe, our readers expect to find an accurate presentation of facts.

It is gratifying to have the confidence of the industry in the matter published by the JOURNAL. We are very jealous of this confidence. We believe it is justified. We spare no pains to make it so. Mistakes do sometimes occur, as in every business. When discovered they are immediately acknowledged and corrected. But the search for facts is continued unremittingly.

This policy has established for the JOURNAL a record for accuracy, and we insist that it shall be second to none.

**Number of Copies Printed, 6,300**




# A grade for each requirement

and each grade is uniform in quality.

Durability, Adhesiveness and Yardage are the principal requirements to look for when buying tape. Westinghouse Tapes have all these features, in addition to many others, which assure perfect results for both electrical and mechanical protection, the two most important functions of Friction Tapes.

Don't be satisfied with merely tape—specify Westinghouse Tapes. A grade for each requirement.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania

**Adhere Friction Tape—** For general requirements.

**IXL Friction Tape—** For motor or generator work and interior wiring. Has extremely high yardage.

**Westinghouse Friction Tape, Straight and Bias—** For all service where highest quality is required.

**Westinghouse Special Splicing Compound—** For all service where best rubber tape is required.

**Pittsburgh Splicing Compound—** For general use where service conditions are not severe or where a low-priced rubber tape is desired.

**Armature Tape—** A high grade, light tape, frictioned on one side only, for insulation on armature coils.



Westinghouse



# STEEL TWIN TIES

## *Low Initial Cost—Long Life Joints Renewable Foundation*

THE REASONS for the continually growing interest in steel tie construction for paved track work which are stated above are definitely based on experience. The cost records for 1924 (where the work was installed with modern equipment) are apparently less on the index basis than prewar costs.

The long life of Joints (the weakest point in any track) is on record showing up to thirteen years experience.

The renewal methods are being utilized on upwards of five miles of steel tie construction this Summer. The first renewal has had a two year test.

**All this data, too voluminous, for this space is included in our folder "Steel Tie Track Construction." Ask for it before settling your 1925 construction plans.**

**The International Steel Tie Co., Cleveland, Ohio**

# Steel Twin Tie Track

**Renewable Track · · Permanent Foundation**

# National Poles are Cedar Poles Plus



NPCO

**Western Red Cedar**

**Light, Durable and Strong**
**Plain or Treated Poles**

**Northern White Cedar**

A NATIONALLY treated cedar pole has little in common with any other cedar pole. It comes from our own vast and unfailing supply of forest tracts. It passes many rigid inspections before it is selected as worthy to bear the N. P. Co. stamp. It has a better opportunity for seasoning, for it's only "one in a million" in the National pole yards. The methods and processes applied to the treatment of a National Pole are as distinctive and superior as years of continued research work on the part of this Company can make it.

And the result of all these painstaking methods is a cedar pole *plus* or, in other words, a National Pole branded with the date of the year of treatment.

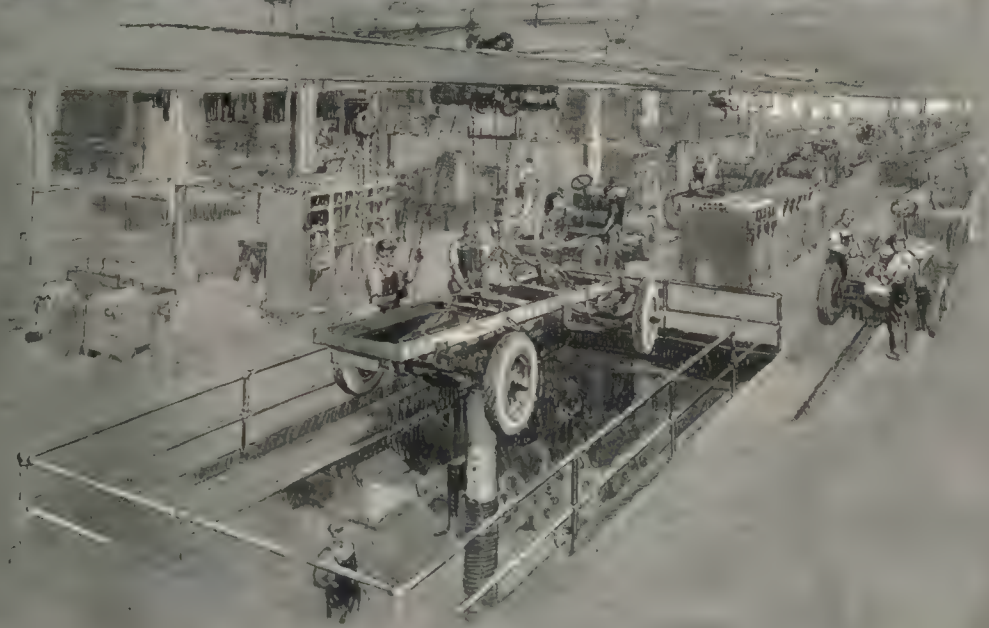
# NATIONAL POLE COMPANY

**Escanaba, Michigan**

*Distributors:*

*Western Electric Company*

# GARFORD



BUILDING TODAY FOR TOMORROWS REQUIREMENTS

THE long life of Garfords—the freedom from expensive, time taking repairs has been the subject of much comment among tradesmen. The reason for this record is no secret—it is the result of clear cut ideals, well coordinated.

THE ORGANIZATION *assures uninterrupted service.*

Garford believes in looking ahead for the transportation needs of tomorrow.

With resources of over $10,000,000 and an aggressive management, consistent advancement is assured. Every member of the executive staff is imbued with this spirit of progress.

Direct factory branches, distributors, dealers and representatives in principal cities give nationwide distribution. Garfords are operated in 46 foreign countries.

THE FACTORY—*Capacity 700 trucks monthly.*

Covers 35 acres, 10 acres under roof, and comprises fifty individual manufacturing and service rendering departments, including plants for gear cutting, thread cutting, drop forging, heat treating, coach building and progressive assembly.

THE LINE *meets every hauling need.*

While all models are built to minimize need for replacement, each part is readily accessible, permitting quick repairs at low cost. Trucks 1 to 7½ tons. Busses 15 to 35 passengers capacity in four and six cylinder models. And Garford instantaneous service is available for owners everywhere.

If you are interested in trucks or busses from any standpoint, communicate with us.

## The GARFORD MOTOR TRUCK COMPANY, Lima, Ohio

*Beginning in 1902, Garford is now among the eight leading companies manufacturing 78 per cent of the bona-fide trucks*

Busses 15 to 35 passengers

Trucks 1 to 7½ tons



# Get around




## "Bus Operating Practice" the first engineering, legal and service reference books

The need for such a manual has been great. Bus owners, until now, have had no reference book available that explains from an authoritative standpoint the many different phases of bus operating practice.

Mack has provided such a book, written by carefully selected specialists. For the first time the knowledge possessed by the best men in the field of bus operation has been placed between book covers. Chapters include such topics as Establishing the Service, Picking Profitable Lines, Securing the Right to Run, Incorporating the Company, Physical Property, Operation, Figuring Profits, etc. Get in your request now.

# Street Paving Costs with Mack Buses

STREET PAVING is often a financial stumbling block—an investment to be avoided if possible.

Buses get around this problem easily and furthermore eliminate the maintenance of track and overhead construction.

And there's a friendly regard for the modern bus on the part of the riding public that makes the change a profitable one for the railway. Those accustomed to riding in street cars are quickly won over to the luxury, speed and comfort of bus service. They like to ride in buses and particularly the Mack. For the Mack bus is only one step from the ground, its springs float in cushions of resilient rubber and its seats are deep, roomy and comfortable.

The sight of a graceful Mack coming down the street is in itself an invitation to ride. There's a friendly welcome on the running board.

From an engineering standpoint, the advantages of the Mack bus are many. Mack bus engineers have carefully worked out all the features that ensure utmost economy in daily operation and maintenance costs. That these features are skillfully incorporated is safeguarded by the fact that Mack *builds* the things it plans. For example—

The sturdy long-life Mack engine.

The Mack dual reduction drive axle, especially designed to give maximum road and underbody clearance.

The Mack transmission with ground gears.

The specially designed low bus chassis.

Wide front axle, assuring safety and permitting a short turning radius.

Dual system of brakes on wheels and drive shaft.

The Mack Street Car Body.

From bumper to tail-light the Mack is all bus. Planned by Mack. Built by Mack.

MACK TRUCKS, INC.

INTERNATIONAL MOTOR COMPANY

25 Broadway New York City

Eighty-three direct MACK factory branches operate under the titles of: "MACK MOTOR TRUCK COMPANY" and "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION."

## The Mack Bus



25 Passenger, City Type

## Performance counts!



# *Ask The Man Who Knows Us*

SOMEWHERE near you there's a Street Railway man who is responsible for keeping down maintenance. His road is buying Texaco Lubricants and receiving Texaco Service.

Ask that man about Texaco Service. He will describe to you the friendly co-operation of Texaco Engineers. He will tell you how they came on the property, investigated, demonstrated and then made some very favorable recommendations. He'll tell you that, as the years roll on, Texaco Lubricating Engineers stand shoulder to shoulder with him and, in a quiet, interested, intelligent way they aided him in keeping down his costs.

He'll tell you that they never tried to assume any superior attitude, or to attempt to run his business, but that they worked with him in overalls, when necessary, to help him hang up a record of reduced expenses.

Possibly he'll tell you that these men knew what they were talking about, because back of them is the practical experience of all the Texaco Lubrication Engineers accumulated on roads aggregating hundreds of millions of car miles.

This man, if he is familiar with all the facts, will tell you that Texaco Lubricants are known, recognized and employed the world over in every branch of industrial endeavor. And so he was able to receive promptly, at all times, the correct grade of lubricant for every kind of equipment, for rolling stock, power plant, shop or truck.

And also Kerosene Burning Oils and Gasoline.

THE TEXAS COMPANY

DEPT. R-J. 17 BATTERY PLACE. NEW YORK CITY

HOUSTON - CHICAGO - NEW YORK

OFFICES IN PRINCIPAL CITIES

NORTHERN TEXAS TRACTION COMPANY




The Charles A. Coffin Medal awarded the Northern Texas Traction Company Fort Worth, Texas. George H. Clifford, Vice-President and Manager

# FOR "THE MOST DISTINGUISHED SERVICE" TO A GREAT INDUSTRY

15,500,000,000 people rode on the electric railways last year. The honor of winning the Charles A. Coffin award to the company which during the year contributed most to the development of electric railway service goes to the Northern Texas Traction Company. This company has been under the executive management of Stone & Webster, Inc., for 19 years.

---

# STONE & WEBSTER

INCORPORATED

DESIGN · BUILD
OPERATE
FINANCE

NEW YORK BOSTON CHICAGO

NORTHERN TEXAS TRACTION COMPANY

# Northern Texa



## *Fort Worth*

**"Out where the west begins"**



## The Modern Electric Railway is an essential industry

It furnishes a service that is personal to every individual in the community and it should be sold to him.

The electric railway business, in the last analysis, is fundamentally the same as any other retailing business and it must be MODERNIZED, PERSONALIZED and MERCHANDISED.

The conditions under which we are operating permit of our success unless we keep up with the and this keeping up is not possible if we try to pr transportation service with the same standards w

***These are***



*Interurban Limited Train*



*Interior of Repair Shop*

NORTHERN TEXAS TRACTION COMPANY

# Traction Company





## Dallas

**"The City of the Hour"**

years ago. We must provide a 1925 service to a 4 age—we must keep ahead.

re are three ways to keep ahead:

**d our industrial publications.**
**Encourage our manufacturers.**
**Use our electric railway association.**

e industrial publication is the messenger that brings our offices the latest developments of other com- ies and manufacturers from which may be selected the gs that are best for our needs.

e manufacturer, of course, sells his products for a fit but we are not getting our money's worth unless we also take advantage of the service he offers with his goods. The manufacturer's representative is not just a selling agent; he is a mine of information from which great good can be extracted in proportion to the time that is spent in knowing him.

Whatever progress the industry has made and will make is, to a great extent, dependent upon the encouragement we give the manufacturer to produce new and better things.

The "put and take game" applies to our American Electric Railway Association. The value we will take from this association depends upon the time we put into it. The committee work, the conventions, the data sheets and publications, in fact all the association services, are intended to keep us up-to-date and we must do our part to help if we expect the best results.

**NORTHERN TEXAS TRACTION COMPANY, FORT WORTH, TEX.**

***Winner of the 1924 Coffin Medal for Electric Railways.***

## all modern



*The "White Cars"*



*Typical City Cars*

NORTHERN TEXAS TRACTION COMPANY

# Sub Stations



Exterior of Northern Texas Traction Company Automatic Substation




# Westinghouse

NORTHERN TEXAS TRACTION COMPANY

# All Westinghouse

ALL Substation Equipment on the Northern Texas Traction Company's system is Westinghouse.

The entire system is operated from six manually operated and one automatically controlled substations.



Interior of Northern Texas Traction Company Automatic Substation

# Westinghouse

NORTHERN TEXAS TRACTION COMPANY



# Maintenance

## of Way and Structures

# reduced 44%

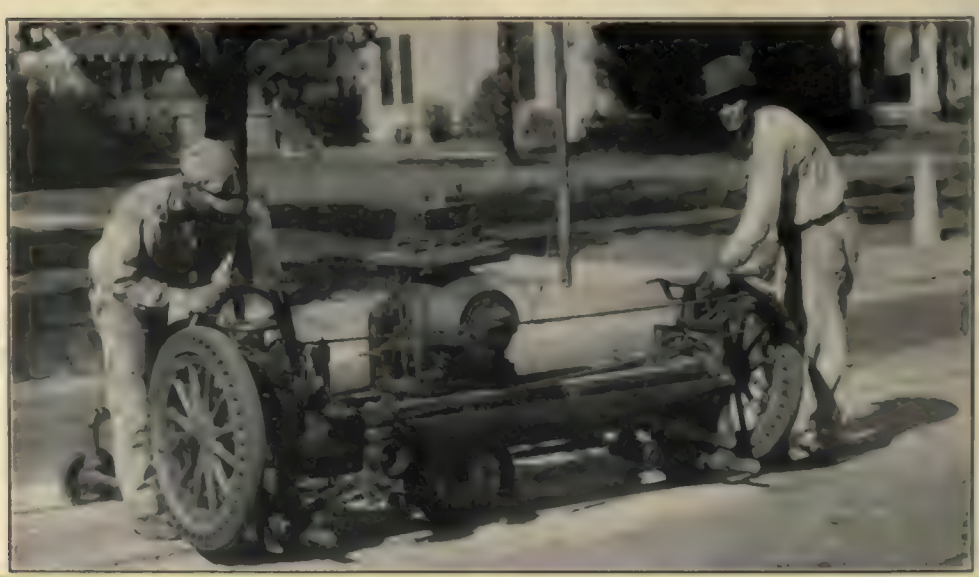
This is what the prize-winning Northern Texas Traction Co. says:

"The cost of maintenance of way and structures has come down from 2.5 cents per car mile in 1920 to 1.4 cents in 1924. Besides the effect of light-weight rolling stock in this figure, the extensive use of track-welding equipment and modern track tools have had a bearing on producing the results."

The "Ajax" Welder, the "Universal" Grinder and the "Reciprocating" Grinder helped to achieve the result.

**Railway Track-work Co.**

3132-48 East Thompson Street, Philadelphia



Agents

Chester F. Gailor, 30 Church St., New York

Chas. N. Wood Co., Boston

Electrical Engineering & Mfg. Co., Pittsburgh

Agents

Atlas Railway Supply Co., Chicago

Equipment Engineering Co., London




# STATION CCH broadcasting a victory for its HEATERS

**This is Station CCH, the Consolidated Car Heating Company at Albany, headquarters for electric car heaters.**

## COFFIN MEDAL winner specifies "CONSOLIDATED"

Down in the Lone Star State, when the "Texas northers" howl, this road is ready!

When the Northern Texas Traction Company bought its modern type Birney Safety Cars and its latest interurbans, Consolidated Electric Car Heaters were chosen as a matter of course.

Like other leading railways from coast to coast, this prize-winning company recognizes Consolidated supremacy.

**CONSOLIDATED**

# HEATERS




## CONSOLIDATED CAR-HEATING COMPANY

New York ALBANY Chicago

NORTHERN TEXAS TRACTION COMPANY

# The line material-





NORTHERN TEXAS TRACTION COMPANY

# B of course!

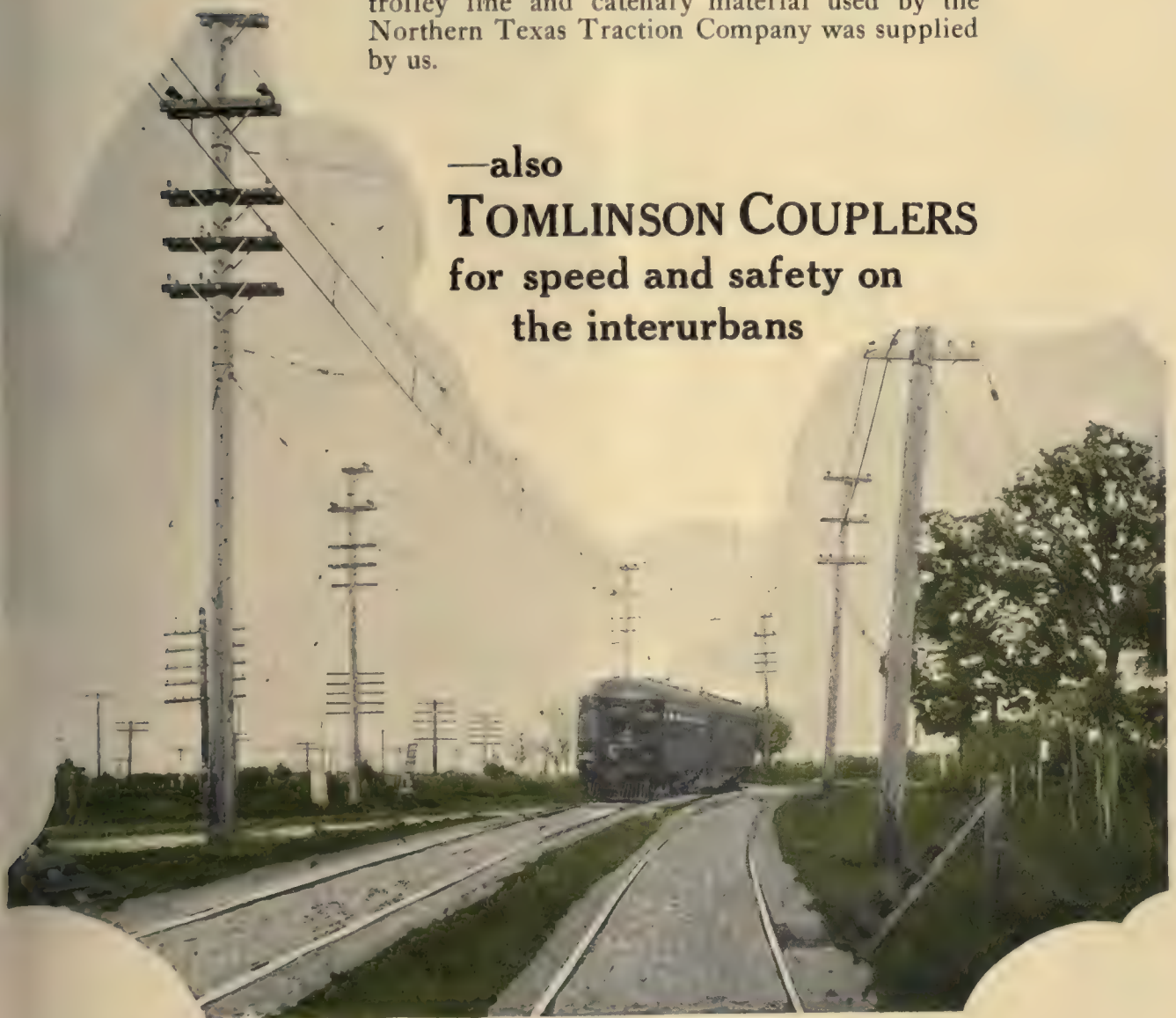
Probably no other single factor of railway operation contributes so directly to the maintenance of efficient low-cost service as does a thoroughly dependable overhead system.

So we are justly proud that all of the overhead trolley line and catenary material used by the Northern Texas Traction Company was supplied by us.

—also

## TOMLINSON COUPLERS

**for speed and safety on the interurbans**



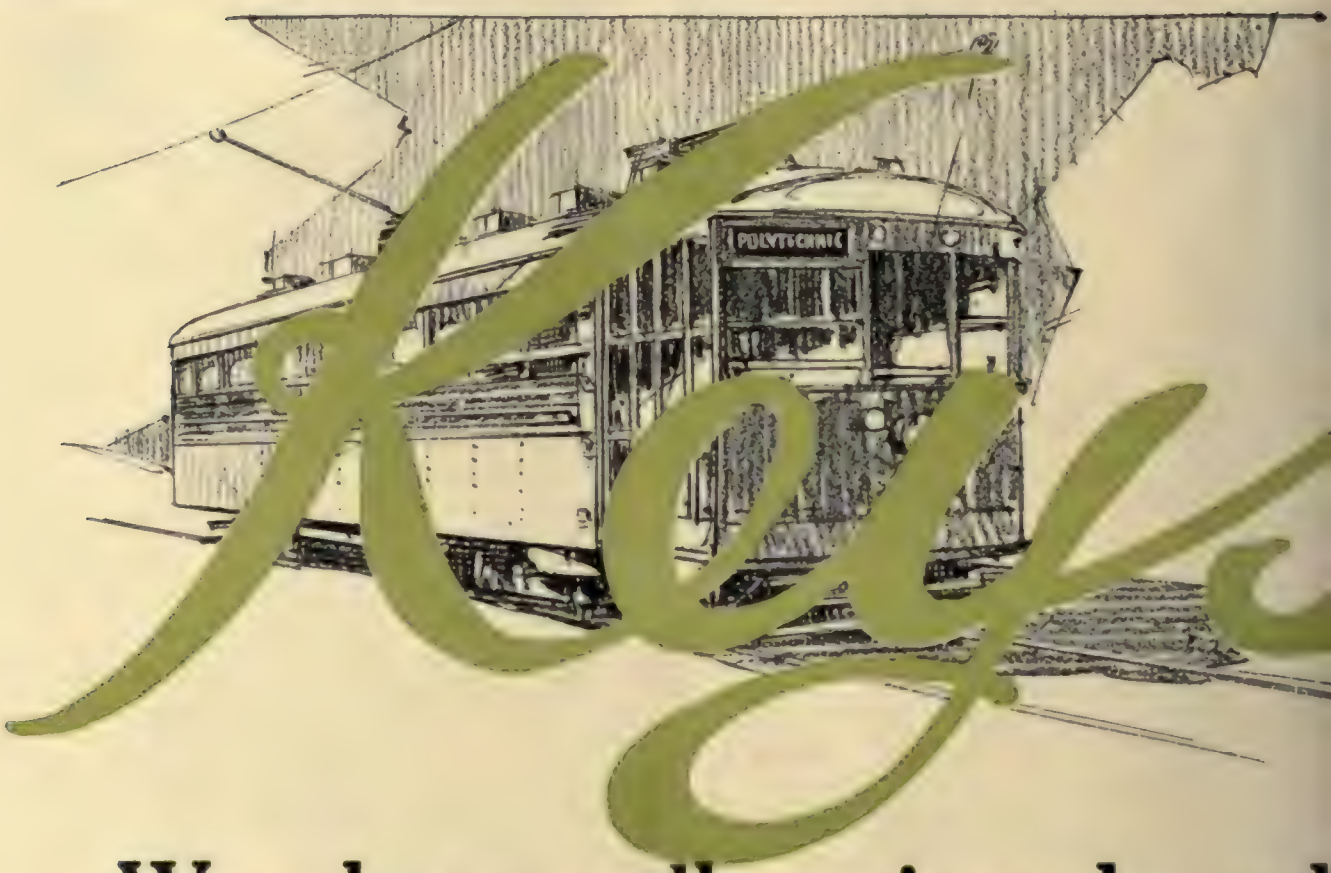
**The Ohio Brass Co.**

**Mansfield, Ohio, U.S.A.**

TROLLEY MATERIAL - ELECTRIC RAILWAY CAR EQUIPMENT - RAIL BONDS - HIGH TENSION PORCELAIN INSULATORS - THIRD RAIL INSULATORS

NEW YORK — PHILADELPHIA — PITTSBURGH
CHICAGO — CHARLESTON, W. VA.
LOS ANGELES — SAN FRANCISCO — PARIS, FRANCE

Dominion Insulator & Mfg. Co., Limited — Niagara Falls, Ontario, Canada




# Won by a well equipped road

Efficient operation goes hand in hand with efficient equipment!

Service to be attractive and *saleable*, must be given with cars that are modern from end to end.

There's no room on the modern car for any piece of equipment or any device that does not help sell the service or increase the efficiency of operation.

So, let's examine the cars of the Coffin Medal winner! See how Keystone equipment has been used—headlights, trolley catchers, destination signs and car signal system.

## *"Well equipped" means Keystone equipped!*

These Keystone devices on Fort Worth's cars are all winners—all well-known—all popular—all efficient equipment! They are salesmen of service, which have helped the Northern Texas Traction Company to win the highest recognition obtainable in the electric railway industry.

NORTHERN TEXAS TRACTION COMPANY

# tone

*(Written on the record!)*

**Equipment on Fort Worth's modern double truck safety cars!**

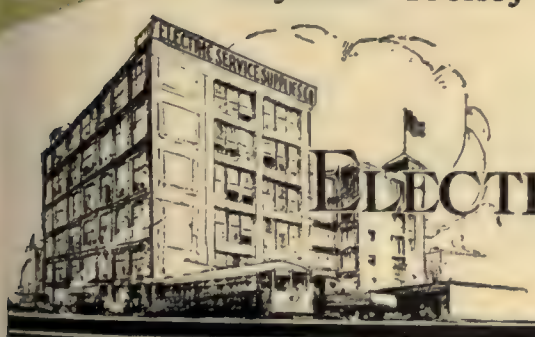


**Keystone-Hunter Illuminated Destination Signs**

**Faraday Car Signal Systems**

**Golden Glow Headlights**

**Keystone Trolley Catchers**




## ELECTRIC SERVICE SUPPLIES CO.

PHILADELPHIA
17th and Cambria Sts.

PITTSBURGH
629 Oliver Building

NEW YORK
50 Church St.

SCRANTON
316 N. Washington Ave.

CHICAGO
Monadnock Bldg.

BOSTON
88 Broad St.

Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver




# They modernized



## Fort Worth's Pioneer safetie

Leading all other electric railways in 100% adoption
the original Birney safety car for city service, the North
Texas Traction Company early showed a most progress
spirit. Its management *grasped Birney's big idea* speed
operation, safer operation and one-man operation! So
thereafter, a hustling fleet of little safety cars was busy
Fort Worth's streets.

And naturally—National Pneumatic Door Engines, inclu
as part of the standard Safety Car Devices Company equ
ment, are found on all these cars, still operating steadily a
satisfactorily.

**Of course it's**
**NATIONAL PNEUMATIC EQUIPMENT**

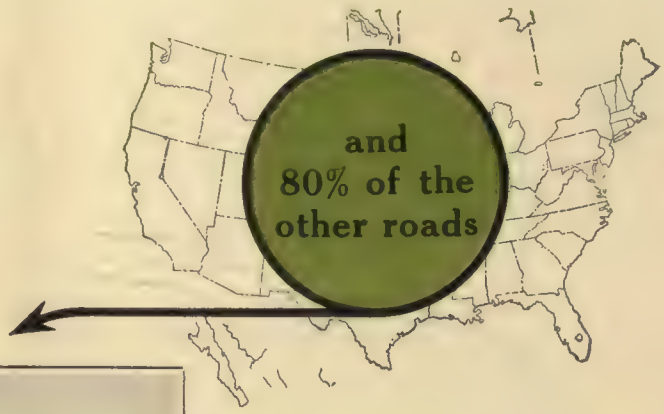
## National Pneumatic Co., Inc.

*Originators and Manufacturers*
***Executive Office:* 50 Church St., New York**
Philadelphia—1010 Colonial Trust Bldg. Chicago—940 McCormick B
General Works—Rahway, New Jersey
*Manufactured in Canada by* Dominion Wheel & Foundries, Ltd., Toronto, O



NORTHERN TEXAS TRACTION COMPANY

# nd pneumatized






## Fort Worth's latest safeties

Modern requirements have developed the larger-capacity double-truck safety car, and the Northern Texas Traction Company has ever kept abreast of the times. A sample of its up-to-the-minute rolling stock is illustrated above.

Asked as to door equipment installed on these most modern cars, the Northern Texas officials' answer came "National Pneumatic door engines on *all* our city cars." Again—these National Pneumatic Door Engines were included as part of the standard Safety Car Devices Company Equipment.

A vast majority of America's electric railways echo—"We do likewise!"

**National Pneumatic Co., Inc.**

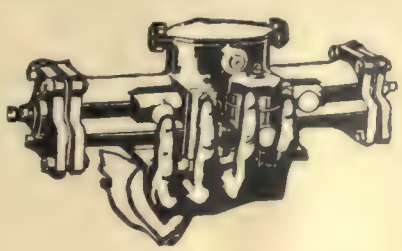
*Originators and Manufacturers*

***Executive Office:*** **50 Church St., New York**

Philadelphia—1010 Colonial Trust Bldg. Chicago—940 McCormick Bldg.
General Works—Rahway, New Jersey
*Manufactured in Canada by* Dominion Wheel & Foundries, Ltd., Toronto, Ont.

**Of course it's**

**NATIONAL PNEUMATIC EQUIPMENT**



NORTHERN TEXAS TRACTION COMPANY

# *The first 100% safety car property in America—*





One of the new double-truck cars now being used on the Fort Worth City Lines of the Northern Texas Traction Company, fully equipped with Safety Car Devices.

The North
Texas Tract
Company w
the first co
pany to op
ate 100% B
ney Safety C
Service
Americ
These cars
ing the sing
truck typ
Later doul
truck Safe
Cars were p
in service.

This single-truck Birney safety car, equipped with Safety Car Devices, is the type that helped build patronage for the Northern Texas Traction Company.

# SAFETY CAR DEV

## OF ST. LOUIS, MO.

*Postal and Telegraphic Address:*

## WILMERDING, PA.

CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH

NORTHERN TEXAS TRACTION COMPANY

# *Now the Coffin Prize Winner*

One of the outstanding features of the Northern Texas Traction Company's operating record is the steadily increased number of passengers carried and the consistent decrease in costs per mile. The awarding of the Coffin Prize to the Northern Texas Traction Company is evidence of the soundness of their judgment in the selection of equipment.

## *lways equipped with*
## SAFETY CAR DEVICES

## s Co.



TEXAS
TRACTION
COMPANY



# Once mo

# MILLER
# TROLLEY
# SHOES

on all these cars









Miller Trolley Sho

NORTHERN TEXAS TRACTION COMPANY

# with the winner!

**This year with the Northern Texas Traction Company — last year with the Chicago, North Shore & Milwaukee Railroad Company, MILLER TROLLEY SHOES and the Charles A. Coffin prize surely seem to hang together — naturally so, as they are both consistent with progressive railway practice.**

## Used on all city cars as well as all high-speed interurbans—

The illustrations show cars of the Northern Texas Traction Company, 1924 Coffin prize winner, which operates all the street railway service in the city of Fort Worth, Texas and also interurban service between Fort Worth and Dallas, a distance of 34 miles providing a high-speed, frequent schedule between these two cities.

MILLER TROLLEY SHOES *are used for both the city and interurban cars.* They have proved superior to trolley wheels under actual tests conducted by this Company.

The Company owns 177 miles of equivalent single track, 192 city cars and 58 interurban cars. By paying rigid attention to all details of operation as for example by the adoption of MILLER TROLLEY SHOES, the ratio of operating expense to gross revenue has been kept down to the low figure of 61 per cent for the year.

The necessity of replacing trolley wheels after they had run only 500 to 1000 miles caused the Northern Texas Traction Co. to make a careful study to determine the cause of such excessive wear. At that time trolley wheels were arcing badly because of the irregular shape which they acquired soon after being installed. Increased tension was tried as a remedy but this resulted in an average of 45 trolley wire breaks per month.

As a possible solution it was decided to substitute MILLER TROLLEY SHOES on the city and interurban cars.

After the change the Company kept an accurate record of mileage and performance. It was found that MILLER TROLLEY SHOES gave excellent contact with fewer dewirements. Only 15 lbs. tension was used in the trolley base instead of 25 to 35 lbs. tension, required when using trolley wheels.

An interesting table of comparison of replacement costs is shown in the lower right hand corner. Note the effect of installing MILLER SHOES, even on part of the cars.

Since installing MILLER TROLLEY SHOES the breaks have decreased to an average of two per month.

MILLER TROLLEY SHOES on this line are averaging more than 7500 miles per shoe on city service and better than 3000 miles per shoe on interurban service.

**COMPARISON OF REPLACEMENT COSTS FOR COLLECTION EQUIPMENT FOR THE YEARS 1920 AND 1922**

| *Year* 1920 | Used | Cost |
|---|---|---|
| Trolley poles 10 ft. 8 in. | 128 | $363.52 |
| Trolley poles 12 ft. 6 in. | 95 | 351.50 |
| Fixtures: | | |
| Bearings | 738 | 287.82 |
| Renewable washers | 1,561 | 93.66 |
| Contact rings | 1,476 | 291.88 |
| Contact springs | 1,669 | 216.97 |
| Trolley harps, type "C" | 200 | 480.00 |
| Trolley rope | 1,850 | 1,377.60 |
| Trolley wheels | 1,932 | 3,272.32 |
| Total replacement costs for year 1920 | | $6,735.27 |
| *Year* 1922 | | |
| Trolley poles 10 ft. 6 in. | 44 | $161.04 |
| Trolley poles 12 ft. 6 in. | 63 | 285.39 |
| Fixtures: | | |
| Bearings | 60 | 23.40 |
| Renewable washers | 128 | 3.34 |
| Contact rings | 96 | 13.24 |
| Contact springs | 110 | 14.30 |
| Trolley harps type "C" | 0 | ..... |
| Trolley rope | 1,399 | 798.16 |
| Trolley wheels, 6 in. | 621 | 838.35 |
| Miller trolley shoes | 159 | 802.95 |
| Miller contacts | 1,343 | 2,377.11 |
| Miller shunts | 86 | 57.68 |
| Miller lockwashers | 6 | .29 |
| Miller bolts and nuts | 469 | 15.01 |
| Miller center pins | 32 | 18.24 |
| Total replacement costs for year 1922 | | $5,408.50 |
| Difference in total costs for the two years in favor of the year 1922 | | $1,326.77 |
| Cost per M.C.M. for collection equipment, 1920, cent | | 0.751 |
| Cost per M.C.M. for collection equipment, 1922, cent | | 0.642 |

*Note:*—All cars were equipped with 6-in trolley wheels during 1920, while during 1922 a large per cent of the cars were equipped with Miller trolley shoes.

*Note:*—In the above comparative costs the cost of trolley bases and repairs are not considered.

NORTHERN TEXAS TRACTION COMPANY




# *From Mules to Kilowatts*

SINCE 1875, when General Darnell was carried from a sickbed into the Texas legislature to vote "no" on its adjournment until the construction gang of the infant Texas and Pacific R.R. could rush completion of the remaining few miles into the city, the citizens of Fort Worth have been acutely railroad conscious. Twelve trunk lines now serving Fort Worth add confirmation of this fact.

Only one year after the city was thus linked with the world, the first street railway was built. A historian* describes it as having "cars about the size of an ordinary street omnibus and propelled by one mule something larger than a West Texas Jack Rabbitt." The expanded traction system later gained the distinction of being the first in the country to become entirely electrically equipped.

With such a background, it is not difficult to see why the North Texas Traction System of Fort Worth and environs was given the Coffin award for general improvement and efficiency in 1924.

Nor is it surprising that early recognition was given by that system's management to Phono-Electric Trolley wire with its long-wearing, strong, ductile and non-corroding qualities. Phono-Electric has been used there for nearly twenty years and the management reports satisfaction from every mile installed. It costs more per mile but less per year.

*B. B. Paddock

MEMBER NEMA

"Bridgeport BRASS TRADE CO MARK Phono-Electric

**Bridgeport Brass Co.**

**Bridgeport, Connecticut**

NEW YORK PHILADELPHIA CHICAGO DETROIT

Phono-Electric

# *"For reducing the number and seriousness of accidents" Awarded the Coffin Prize—*




*One of the Northern Texas Traction Company's new Birney Safety Cars on which H-B Life Guards are standard equipment.*

# H. B. LIFE GUARDS

***Manufactured by***

## The Consolidated Car Fender Company

are included in the safety equipment of The Northern Texas Traction Company, Coffin Prize Winner this year.

**Life Guards Manufactured By Us Assure**

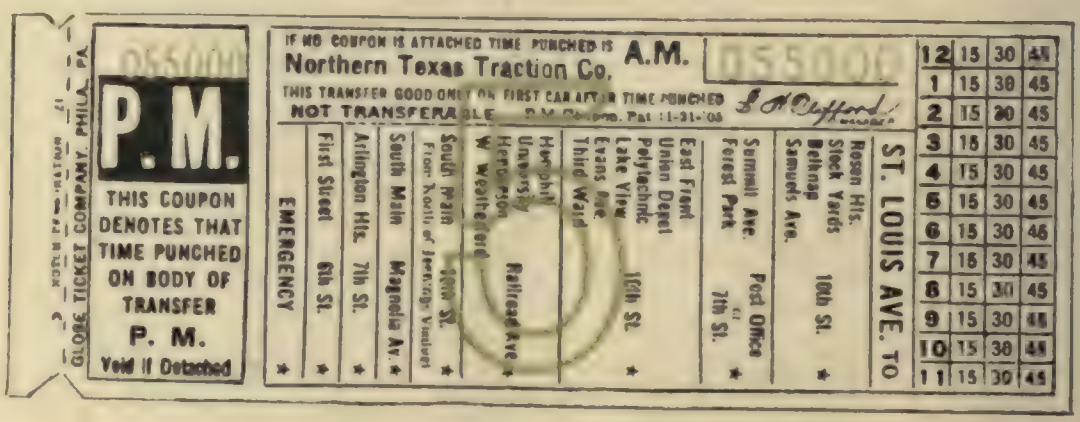
*Maximum Safety—Minimum Maintenance Cost*

**CONSOLIDATED CAR FENDER CO., Providence, R. I.**

**Wendell & MacDuffie Co., 110 East 42nd St., New York, N. Y.**
***General Sales Agents***

# We add our voice

to the chorus of cheers which
greet the winner




## Northern Texas Traction Co.

deserve all the praise they receive.
So do their general managers

## Stone and Webster

**It is a privilege to serve such management**

## Globe Ticket Company

*Specialists in Tickets and Checks since* 1872

**116 N. 12th St., Philadelphia**

TEXAS TRACTION COMPANY




Used on the Prize-Winner

# SHERWIN-WILLIAMS

## PAINTS AND ENAMELS

are standardized on by the Northern Texas Traction Company, Fort Worth, who won the famous Coffin Foundation Award for the past year. This conspicuous example emphasizes the recognition so generally given to the Sherwin-Williams policy of providing "the RIGHT finish for each surface." In a word, every S-W finish supplied to transportation companies is the result of searching study into the surface requirements in the field where these finishes must serve and serve well. No guess work.

*Information, recommendations and prices will be given promptly.*

The Sherwin-Williams Company, 601 Canal Road, Cleveland, Ohio

*Largest Paint and Varnish Makers in the World.*

NORTHERN TEXAS TRACTION COMPANY



# Quality" Interurbans

## Helped Win the Prize

WHEN the Northern Texas Traction Company decided on their FINE interurban cars, St. Louis Car Company filled the order. "Quality" cars on this prize-winning road are further testimonials of the prestige and high standing of "Quality" rolling stock. Their attractive, comfortable riding qualities and superior interior appointments have done their full share toward backing up this progressive road in its campaign for popularizing electric railway transportation and winning for it the Chas. A. Coffin Medal.

**St. Louis Car Company, St. Louis, Mo**

"The Birthplace of the Safety Car"

NORTHERN TEXAS TRACTION COMPANY

SKF



# Skayef Armature Bearings

## An Essential For The Modern Car!

ANOTHER indication of the progressive spirit of the Northern Texas Traction Company is indicated in the use of Skayef Armature Bearings on their modern light-weight safety cars.

Ten of these cars were ordered early in 1923, and in October, 1923—or more than a year ago—they arrived and were put in operation. Equipment consisted of four motors per car, with Skayef Ball Bearings on the armatures.

The trend of modern thought in car design is toward the use of anti-friction and roller bearings wherever possible, and when people think of ball bearings the familiar designation **SKF** comes to mind.

**THE SKAYEF BALL BEARING COMPANY**

**Supervised by SKF INDUSTRIES, INC., 165 Broadway, New York City**

1301




*Normal View* *Deflected View*

NORTHERN TEXAS TRACTION COMPANY

# Seven Years of th




...nat street railway transportati...
... the best transportation for general c...
...ervice.

It was finally determined to construct t...
...cars as a sample or demonstration cars, a...
...arrangements were made for the bodies to be bu...
...by the American Car Company of St. Louis, t...
...trucks by The J. G. Brill Company of Philadelph...
...the electrical equipment by the General Electr...
...Company of Schenectady, and the air-brake a...
...safety-control equipment by the Westinghou...

[78 ]

## Turning back the pages of history we find—

whole stories in the *Electric Railway Journal* devoted to this pioneer experiment in Fort Worth—the Birney Safety Car. And linked with the first cars of this type ever built, is the name —*American Car Company.* That they're still operating many of the earliest types of safeties is a tribute to the excellent design and workmanship in this equipment.

And after seven years of unequalled success, the latest development of the Birney Safety Car is helping to bring fresh honors to the Northern Texas Traction Company.

**THE J. G. BRILL COMPANY**
PHILADELPHIA, PA.

AMERICAN CAR CO. ST LOUIS MO. — G.C. KUHLMAN CAR CO. CLEVELAND, OHIO. — WASON MANF'G CO. SPRINGFIELD, MASS.

NORTHERN TEXAS TRACTION COMPANY

# irney Car in Fort Worth

## Now the Coffin Medal goes there!




**These last safety cars—like the first ones were built by the American Car Company!**

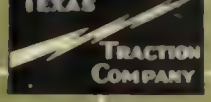
***Some of the interesting specifications were:***

| | |
|---|---|
| Seating Capacity | 48 |
| Body weight | 11,542 lb. |
| Trucks | 8480 lb. |
| Equipment | 6978 lb. |
| Total weight | 27,000 lb. |
| Length overall | 40 ft. 1 inch |
| Body | All steel |
| Interior trim | Mahogany |
| Axles—Brill M. C. B. | Forged steel |
| Bumpers | American Car Company Channel |
| Center and Side Bearings | Brill Oil Retaining |
| Couplers | American Car Company Pocket Type |
| Journal Bearings | Brill |
| Journal Boxes | Brill M. C. B. |
| Springs | Brill |
| Trucks | Brill Type 77-E-1 |

**We are prepared to furnish all modern types of rolling stock,—Safety Cars, City and Double-truck City Cars, Interurbans, Railless Cars and Steel Bus Bodies—equipment to meet any transportation requirements.**

**THE J. G. BRILL COMPANY**
PHILADELPHIA, PA.

AMERICAN CAR CO. ST. LOUIS MO. — G. C. KUHLMAN CAR CO. CLEVELAND, OHIO. — WASON MANF'G CO. SPRINGFIELD, MASS.




*Taking their curtain for long, safe service*



# Brake Parts from Fort Worth

# They're BOYERIZED



You railway men know 'em well — tough glossy little fellows, hard as glass, full of "fight" to stand up under the hardest service on city car or interurban anywhere. They helped Northern Texas Traction win.

Boyerizing does it,—gives the steel from which they're made a glossy armor-plate surface that outwears ordinary case-hardened steel not once or twice, but three to four times.

***The Boyerized list includes—***

**Brake Pins**
**Brake Hangers**
**Brake Levers**
**Bushings**
**Center Bearings**
**Side Bearings**
**Chafing Plates**
**Manganese Break Heads**
**Manganese Truck Parts**
**McArthur Turnbuckles**

## The McArthur Turnbuckle

When you once set it up it stays up! The powerful spring equipped split-clamp device which takes the place of the old-fashioned lock-nut idea, holds with an unshakable grip. Yet it takes only a small monkey wrench and a moment's time to tighten it up. Like all other Boyerized equipment, McArthur Turnbuckles have an unusually long wearing life.

**TRY THEM!**



## Bemis Car Truck Company

***Electric Railway Supplies***

**Springfield, Mass.**

**Representatives:**

Economy Electric Devices Co., Old Colony Bldg., Chicago, Ill.
F. F. Bedler, 903 Monadnock Bldg., San Francisco, Cal.
W. F. McKenney, 54 First Street, Portland, Ore.
J. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.

TEXAS
TRACTION
COMPANY



# —as you'd expect!

## PEACOCK STAFFLESS BRAKES

## On their modern safety cars!

Most leading roads are now demanding the Peacock Staffless on both single and double-truck safeties. It becomes a most significant confirmation of their choice, to find that the Coffin Medal Winner does likewise.

### *Chosen because—*

it's *fast, powerful* and above all ample in *capacity* to wind up all the chain and apply full braking power under any conditions.

**National Brake Co., Inc.**
**890 Ellicott Sq., Buffalo, N. Y.**

**Canadian Representative:**
**Lyman Tube & Supply Company Limited, Montreal, Canada**



TEXAS TRACTION COMPANY

The Prize Winner says —



*Screw Spike Driving* — *Tie Tamping*

# "We use Ingersoll-Rand Company's tie tampers and paving breakers—"

PROMINENT among the factors resulting in *lowered unit costs* for maintenance of way, the Brief lists the *"use of modern track tools."*

Modernization programs on every railway system can well afford to include Ingersoll-Rand Equipment—tie tampers, paving breakers, rail drills, grinders, riveters, chippers, spike drivers, and portable compressors. They are all time-saving, and work-speeding devices.

**INGERSOLL-RAND COMPANY, 11 Broadway, N. Y.**

*Offices in the Principal Cities the World Over*

**For Canada, refer Canadian Ingersoll-Rand Co., Limited, 260 St. James Street, Montreal, Quebec**

# Ingersoll-Rand

*It's always fair weather!*





**The Adjustable All-Weather Top**

# FIFTH AVENUE BUSES

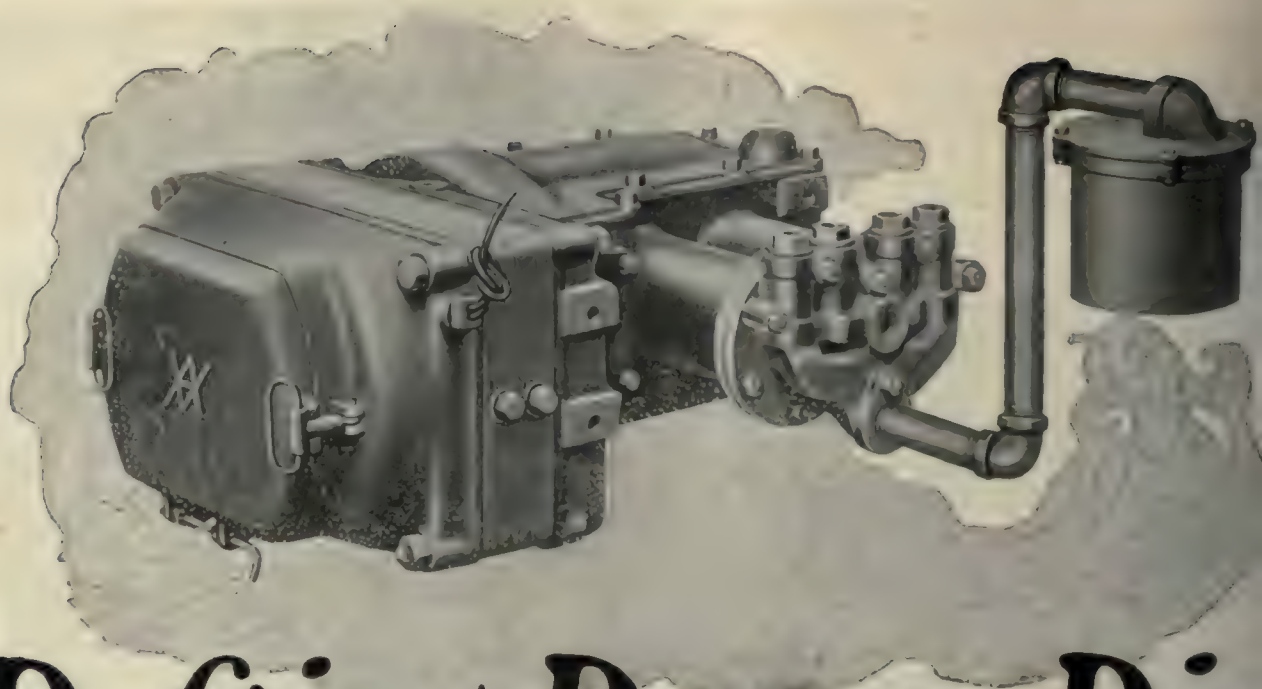
Capitalize the open air ride! The fresh air feature of the upper-deck of our Fifth Avenue Buses will prove to be a drawing card. With our new adjustable all-weather top, the upper deck is still available for revenue riders, in spite of sudden shower, excessive cold or otherwise inclement conditions. It keeps the 55 seats always in service. The upper deck sash drop into pockets, and the curtain top rolls clear back, leaving the upper deck wide open when the weather is suitable.

Fifth Avenue Buses are the practical multiple carriers for mass transportation. The Type L seating 55 passengers, occupies smallest street area, It is only 24 feet 8 inches overall length, 7 feet 6 inches outside width, and under 14 feet in height with the all-weather top.

**Investigate the most practical bus proposition for America's city streets. There is an attractive price quotation waiting for you.**

MEMBER AERA

NEW YORK TRANSPORTATION CO.
New York, N.Y.



# Defying Demon Dir

Around every compressor there is a demon lurking in the air —DIRT. It will stealthily, though surely, work havoc if permitted to gnaw at the vitals of the compressor.

Air must, of course, be drawn in from the atmosphere to be compressed, but dirt will also rush in unless an effective barrier is set up against this pernicious enemy of good compressor performance.

If dirt does enter with the intake air, two things are sure to happen. First, proper lubrication will be destroyed, because the dirt, mixing with the oil, forms an abrasive which causes excessive wear on cylinders, pistons, packing rings and valves. Second, the mixture of oil, dirt and ground iron will deposit in passages and on valves, resulting in lower efficiency of the compressor.

You can repulse the attack of this demon of dirt with the 8-*in. Suction Strainer.* It effectually filters out the grit and dust, permitting clean air to pass on into the compressor. Result—better performance, lower maintenance expense and longer life.

Is *your* compressor thus properly safeguarded against the insidious enemy—DIRT?



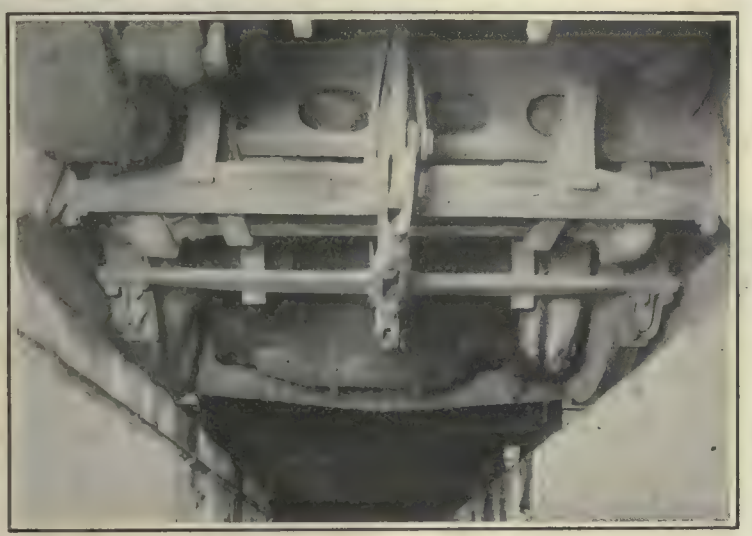
The 8-in. Suction Strainer consists of a cylindrical body with a compact layer of pulled, curled hair between two perforated plates, and is so constructed as to be readily taken apart for cleaning at stated periods.

**WESTINGHOUSE TRACTION BRAKE CO.**

General Office and Works: WILMERDING, PA.

# WESTINGHOUSE TRACTION BRAKE

# Galena Oils and Service



## Where wheels go round—

Hidden from ordinary observation axle bearings, journals, gears and body bearings can get attention only at specified inspection periods. Underneath the car, lubrication must do its work, unwatched, unseen.

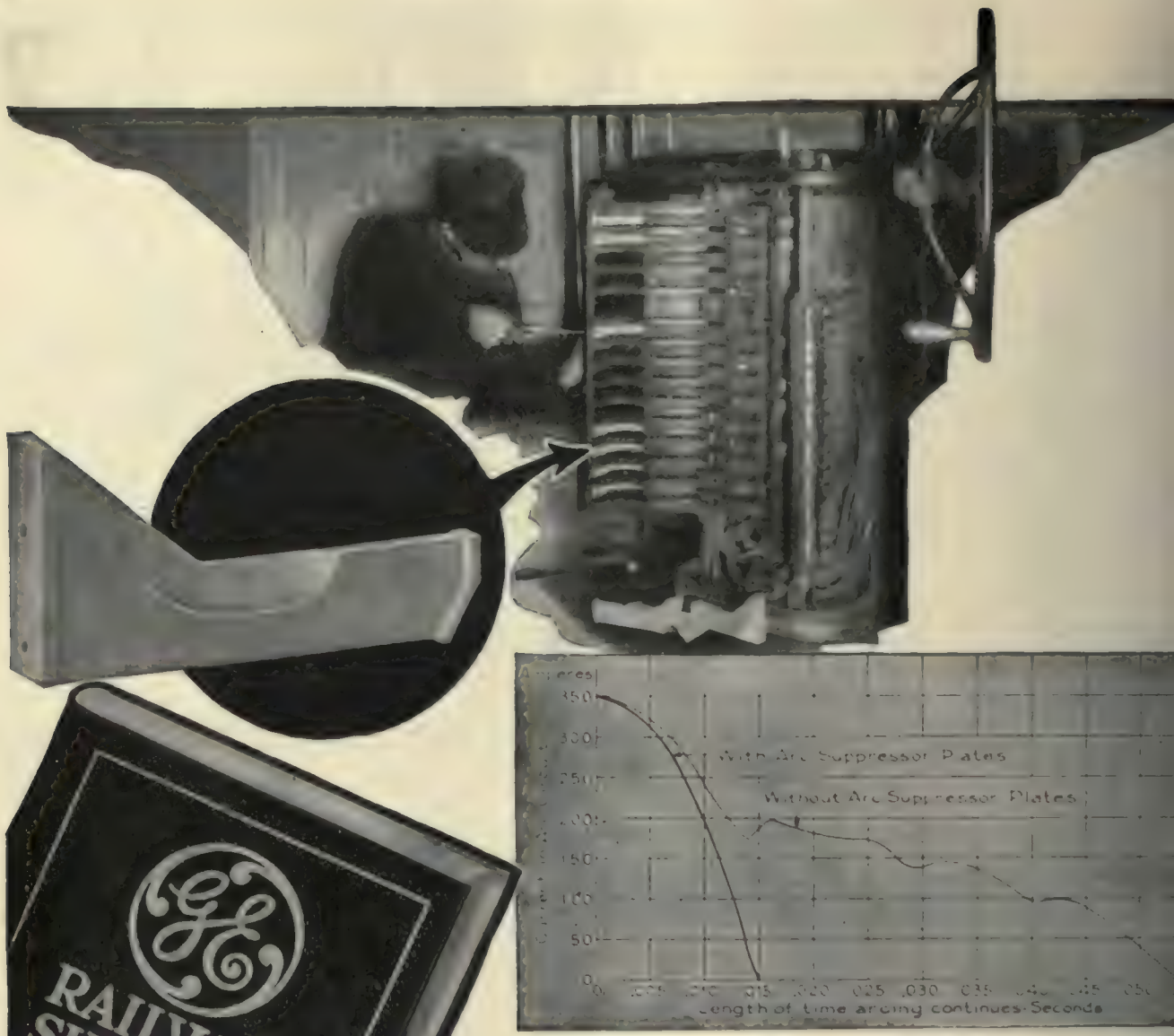
How necessary, then, that lubrication be reliable!

Galena Lubrication has won a well-deserved reputation for reliability because it involves more than the sale of oils and grease. An organized system of service, a check-up on every detail related to the effectiveness and cost of lubrication, and a top-notch quality of lubricating materials, all combine to set Galena as the standard of railway lubrication service. The savings show in the lowered maintenance costs—where adequate, properly-applied lubrication cuts down wear.

## Galena-Signal Oil Company

New York - Franklin, Pa. - Chicago

and offices in principal cities







## Notice the Difference

These curves show the difference in time required to disrupt the arc in a K-35 Controller when equipped with G-E Arc Suppressor Plates. They are plotted from actual oscillograph test data.

G-E Arc Suppressor Plates reduce carbonization and eliminate much trouble from pitting of contacts. All new Controllers with individual finger blowouts are equipped with them.

It will pay you to put them in your old Controllers. The plates are inexpensive, and easy to install. Try them.

On page 149 of your G-E Catalog is the list of G-E Controllers for which Arc Suppressor Plates are available, stating the number required and fingers to be protected.

## Your Text Book on Equipment Standards

**General Electric Company**
Schenectady, N. Y.
Sales Offices in all Large Cities

# GENERAL ELECTRIC

New York, Saturday, November 22, 1924

# Electric Railway Journal

*Consolidation of Street Railway Journal and Electric Railway Review*

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

*Volume 64*
*Number 21*

## hicago Mayor Persists in M. O. Discussion

ROM the results of the recent national election it is evident that the people of the nation do not want ublic ownership of railroads. That decision seems to ave been most emphatically expressed. In Chicago, owever, the Mayor is still endeavoring to work out a lan for municipalization of the surface and elevated roperties. Direct negotiations for the purchase of these nes having apparently failed, Mr. Blair, president of the rface lines, has proposed the consolidation of surface nd elevated lines into a comprehensive one-city, one-are, transportation system under some form of service-cost franchise. Mr. Insull, chairman of the elevated nes, has offered to finance $23,000,000 of rapid transit xtensions if the city will say "go." The Mayor con-nues to favor municipal ownership as the first con-deration in working out a plan for improvement of ansportation facilities.

It is reported that he is carefully waiting for an pportunity of splitting off some one part of the local ansportation system to be used as a club to force more vorable terms from the security holders of the re-ainder, under the threat of extending a competitive ty-owned system. Such a plan would correspond enerally with the method used in Detroit to force the le of the D. U. R. city lines to that city. While con-dering Detroit methods, it might be well for Chicago's ayor to analyze carefully the results accomplished ere by municipal ownership. Even granting that its unicipal system has been successfully kept largely out politics to date, what advantage has municipal owner-ip brought to the car riders? It is hard to find one. fact, such success as has accompanied municipal eration is directly attributable to Detroit's wisdom turning its system over to operating men who tained their training and experience in private enter-ise. The threat of future political interference is nstantly present and is even more aggravated by the sult of the recent election in that city.

It is generally considered that Chicago's Mayor is ncere in his views on municipal ownership. In that spect at least the present administration, from the andpoint of the car rider, is a vast improvement over e one that preceded it. He has, however, shown idence of being so absorbed in the hobby of municipal wnership as to put acquirement of the lines by the ty first, and speedy improvement of the transportation cilities second.

The City Council committee on local transportation is deavoring to work out a plan for submission to the ters in a few months. If that is done, it is to be ped that the people of the city will again express their inion of public ownership as decidedly as was done the national election. Thus the way will be cleared r the speedy adoption of a policy that will permit extension and improvement, just as business in general is responding after the burial of the government ownership bugaboo in national affairs.

## Standardization of Contact Line Should Further Electrification

ONE of the most important things in facilitating progress in the electrification of American trunk-line railroads is the adoption of a common system of current supply. Rightly or wrongly, the attitude of the railroads has consistently been that interchangeability of motive power is essential if electrification is to be extended beyond installations where it has been adopted locally for particular reasons. With standardization of supply, say at 11,000 or 22,000 volts, the steam roads can purchase equipment with the knowledge that it can be used on more than a single division of a single railway.

Details of the locomotives to be operated on the various roads naturally will differ with the service requirements, depending on the physical features and the character of the traffic. So do steam locomotives differ. But the feature mentioned most often by steam railroad men is that any standard-gage steam locomotive can be operated anywhere in emergency, and while it may not be particularly well adapted to the load, it can function so as to handle a certain amount of business. For instance, during the shopmen's strike two years ago many roads used freight engines for hauling passenger trains and vice versa. Certainly it was better to get the trains over the road late than not to move them at all.

Leading railroad men and consulting engineers have felt for some time that the highest contact line voltage is none too high, if trainloads are to continue to increase in the future as they have in the past. The New York, New Haven & Hartford Railroad was the pioneer in high-tension distribution, having adopted a single-phase contact line at 11,000 volts nearly 20 years ago. On its system have been operated electric locomotives of nearly every type ever proposed for alternating current. While it is usually admitted that direct-current motors have advantages from an operating and maintenance standpoint, these advantages are not so great as to overbalance the ability to distribute large quantities of electrical energy economically by means of high tension. The latest types of a.c. locomotives employ d.c. motors with the aid of conversion equipment on the locomotive itself.

With greater and greater concentration of train weights and increase in propulsion power, the load factors have become correspondingly poorer. On a large system this can be compensated for to a great extent by increasing the distance served by a single

substation as much as possible, which in turn demands high voltage to cut down the distribution loss. As an example, consider the supply of 20,000 hp. to one train, the amount mentioned as the input for the Virginian electrification. At 22,000 volts a.c. this would require some 900 amp. and at 11,000 volts 1,800 amp. With 3,000 volts d.c., even making allowance for the advantage of power factor, some 5,400 amp. would be needed, or three times as much. At 600 volts d.c. the delivery of this power would require 27,000 amp. Low voltage d.c. is clearly out of the question. Even at 3,000 volts such amounts of current have been collected only as an experiment. On the contrary, collection of the smaller currents for the high-tension systems is not difficult. The advantage in less distribution copper and the ability to space substations farther apart is obvious, as the copper loss varies inversely as the square of the voltage.

The decision of Henry Ford to use 22,000 volts on his road need occasion no concern. In case the demand for very heavy motive power continues this move is entirely logical. The main problem is insulation on the locomotive. Supposing that 11,000 volts is adapted as a standard, interchangeability need not be affected at all, as the same engines can be used on both systems by designing the transformer primaries for connection in series and in parallel, which can be effected almost instantly by a change-over switch under the control of the engineer.

With standardization on a contact line of 11,000 or 22,000 volts alternating current, there seems no reason why the last of the technical difficulties that for so long have stood in the way of a comprehensive electrification of the trunk lines of this country should not be brushed away. The roads can then proceed with confidence, and the problem can be worked out on economic grounds, so that the lines that should be equipped electrically, either to increase capacity or to give an operating economy, can be converted without delay.

## The Majority of Shoppers Travel on Trolley Cars

A RECENT check made at 13 leading stores in New York City during a busy shopping hour showed that out of 35,252 customers only 813 came by automobile or taxicab. The others came by street car or subway, by bus or on foot.

In these days of the intensive use of the streets, the tendency will become more and more definite to apply the Darwinian theory of the survival of the fittest to determine what street users to favor, as there is not going to be room for every one. The first street users to go are those who want to use busy highways for storage purposes by parking their cars while they go shopping or are on some other business. Such users have the least excuse for street space, and anti-parking laws are being passed to take care of them.

In some cities the next line of attack will be against the car lines in certain busy streets. Indeed, such an attack has been begun. Mayor Hylan has already said that Forty-second Street and 125th Street, among others in New York, should be cleared of car tracks, and there have been suggestions in Los Angeles and other cities that more automobile traffic could be moved through certain busy retail streets, if the car lines were removed.

It is not surprising that such a plan appeals at first thought to the automobile owner. To him every other user of the street is an obstruction in his path. those who have a real interest in ascertaining the fa like the retail merchants, the situation is quite ( ferent, and it is not surprising that in both New Y and Los Angeles, the storekeepers on the stre affected protested against any proposal to abolish lines. In New York the protest would have been m louder if the suggestion had been taken seriously, as it emanated from Mayor Hylan it was looked u only as a part of his plan to pester "the interes

In any contest in which a railway may be enga over its right to serve the public, such evidence the above should make the discriminating local m chants its strongest supporters. They are the first feel the effect of any diminution in service of the l transportation system, and should realize that the gr majority of their customers must reach their stores trolley.

## What Causes Traffic Congestion and How to Relieve It

PROBABLY no phase of the work done during past year by the Transportation & Traffic Asso tion is more important than that dealing with st congestion. This cannot well be denied when vehic congestion is causing a reduction in speed from average of 10 or 12 m.p.h. in the suburbs to so where between 1 and 4 m.p.h. in congested str during the rush hours, as was brought out durin meeting at the recent convention.

Three major causes of congestion mentioned there first, the concentration of large business popula within a small area, a situation resulting from development of the steel frame building; second, increasing number of private vehicles on the stre and third, automobile parking.

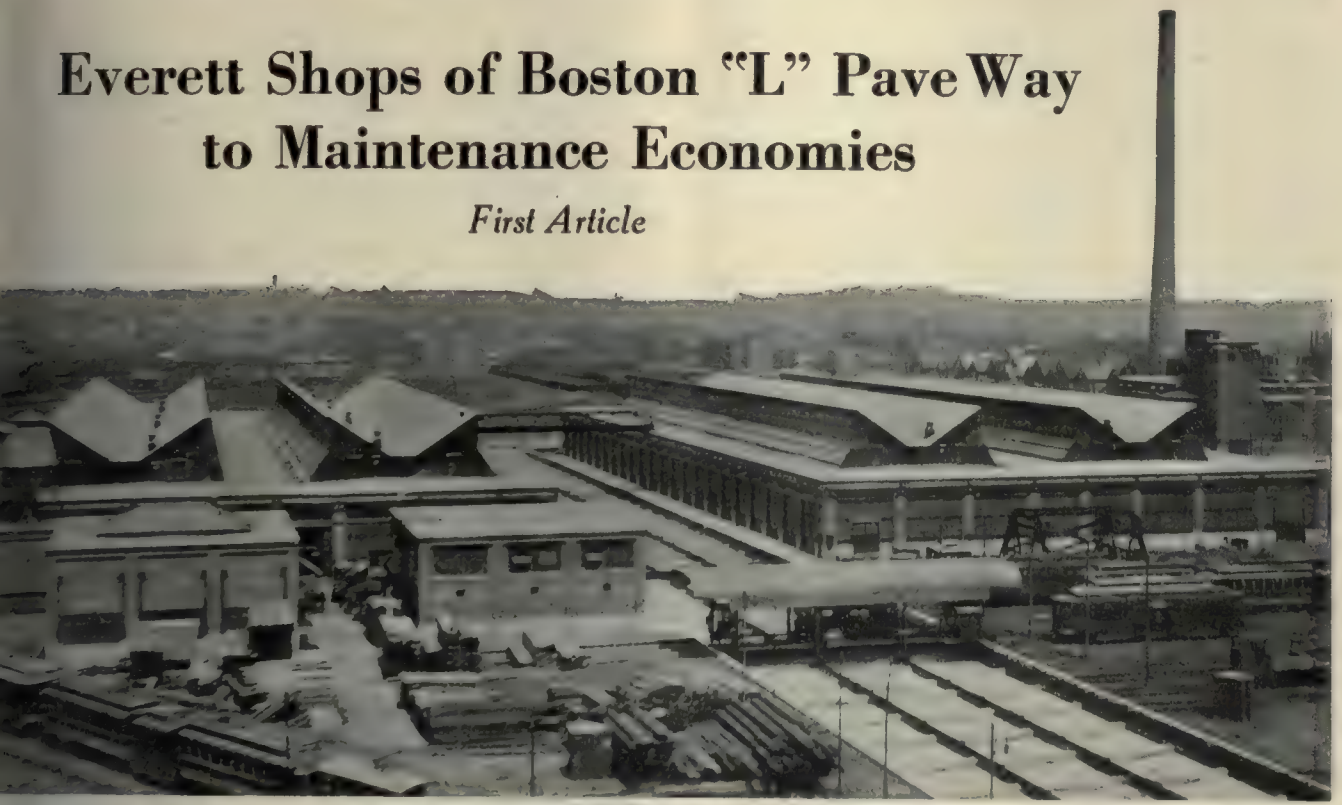
Suggested remedies fall into two groups. The consists of methods to increase the area available traffic, i.e., street widening, etc., and the second ways to increase the usefulness of the existing tr area. The first group the committee finds unsatis tory because of the likelihood that the increased will immediately attract increased traffic in suffic amount to nullify any advantage.

In the second group of proposed remedies the eli nation of auto parking, especially during the r hours, is the most important. To accomplish anyth along this line it will be necessary to secure the operation of the general public. How best to do is quite another thing.

A committee studying this subject has recommen the appointment of a permanent committee. Good res are likely to come by such a step. Here is a prob that affects vitally not only every railway, but ev street car rider, every automobile or truck driver, ev merchant, every property owner—in fact, every resi of every city worthy of the name. The problen all the more difficult because it is so widespread, person having more or less well defined opinions the subject. The thing to do is to keep at it, to out as many plans as seem to have any merit an study the results carefully. Progress in the relie traffic congestion has been made in some cities, in ways that will apply to the rest of the country. collecting and disseminating information as to how is being done, undoubtedly a better understandin the problem will result, and real congestion relief be obtained.

# Everett Shops of Boston "L" Pave Way to Maintenance Economies

*First Article*



The New Shops of the Boston Elevated Railway Occupy a 22¾-Acre Site Adjacent to the Everett Terminal of the Elevated Line

**The New Layout, Which Provides for All Equipment Repairs Except for the Cambridge Subway, Was Decided On After Careful Survey of Requirements—Growth of the System Dictated Concentration of Facilities for Rolling Stock Maintenance—Comprehensive Provision for Mechanical and Electrical Services**

STRATEGICALLY located to reduce dead mileage to the minimum, designed to meet the increasing demands of rolling stock maintenance on this transit system for years to come and finely equipped with woodworking and paint shop machinery and individually motorized tools, the Everett shops of the Boston Elevated Railway mark a distinct advance in traction repair facilities and point the way toward substantial economies in administration. Preliminary drawings of these shops were published in this paper March 19, 1921, and in the issue of Feb. 10, 1923, a general description was given of the layout of the buildings and the proposed routing of the work. Thus far the company has built only the paint shop, lumber storage, dry kiln, boiler house and wood shop, with related yard facilities as mentioned in the latter article. The steel-working shops or general machine shops have not yet been begun, as appropriations for these have not been available. Consequently there has been no opportunity as yet to secure the full economies anticipated from the ultimate layout, but on the woodworking and painting sides of rolling stock maintenance material gains in convenience have already been attained.

## Need for Increased Facilities Recognized Early

For many years the company has needed proper shop facilities for taking care of rolling stock maintenance, though large investments have been made for new and improved cars, heavier tracks and for power generation and transmission equipment. Many of the shop facilities used up to the occupation of the new shops were relics of the horse car days. The principal shop was located at Bartlett and Washington Streets, Roxbury, in an old horse car barn, which after electrification was converted into a car repair shop by making such improvements as were possible without a general remodeling. The greater part of the surface car repairs, except work on trucks and motors, was done there.

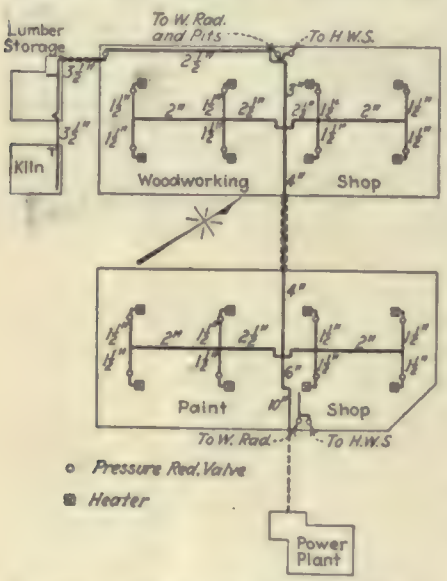
This arrangement worked fairly well for a while, but as the number and the size of the electric cars increased, this shop became more and more inadequate and inefficient. While there was considerable land available at the Bartlett Street site, there were no railroad facilities, so that expansion at this point was deemed inadvisable. Another shop which was in use for many years was a remodeled building on Albany Street, 1¾ miles away, and also without railroad facilities, which was purchased in 1889 as part of a site for the electric railway power station, and which was remodeled as a truck and blacksmith shop. The upper floors of this building were destroyed by fire in 1912, and an adjoining building was leased to provide additional space for the machine shop.

As the amount of rolling stock continued to grow it became necessary to handle at the individual carhouses much of the heavier maintenance as well as some painting. Then, too, a considerable area of the Bartlett Street shops became unusable since the transferway, elevators and track clearances were too small to permit the movement of the larger cars. By cutting notches in the columns some of the cars could be handled, but without sufficient room between tracks for good work. There was no

space for lumber storage near the mill room, and frequently lumber had to be handled 200 ft. to be finished.

Beginning with rapid transit service in 1901, it was necessary to provide shops for the elevated cars. The first shop was built at Sullivan Square, all the work being done there except for the inspection and cleaning done at first in a small shop at Guild Street, adjoining the Bartlett Street surface car shop, and later in an inspection yard and shop at Forest Hills. With the construction of the Everett extension the inadequacy of repair facilities for the elevated was aggravated, since the construction of the main line tracks necessitated the removal of a portion of the shop.

The Cambridge subway was constructed independently of the remainder of the rapid transit system, and the cars are so large that they cannot be operated over the remainder of the tracks. Accordingly a modern inspection and repair shop was built at Eliot Square, Cambridge, adequate to provide for this division and for the East Boston tunnel cars. An inspection loop is also planned in connection with the electrification of the Shawmut branch of the New Haven Railroad which will be operated under lease as a part of the Dorchester tunnel extension.

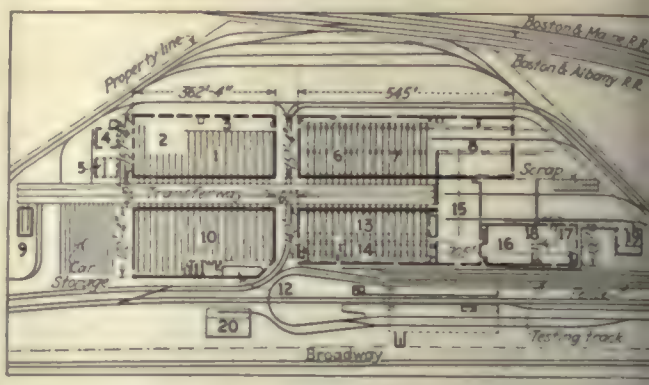



Layout of Heating Mains for Buildings Already Constructed

For a number of years the company has been investigating the selection of a proper site for repair shops. The primary needs were felt to be accessibility to both surface and rapid transit lines and proper steam railroad and water transportation facilities. Such a site was chosen on a 22½-acre plot adjoining the Everett terminal of the rapid transit and surface lines. This site borders on the Mystic River and is within a 15-minute ride of the center of Boston.

Owing to the unsatisfactory conditions at Bartlett Street, particularly lack of room for car painting, it was decided that the first unit at Everett should replace those facilities. This unit, work on which began a year and a half ago, consists of a woodworking shop, paint shop, lumber building and dry kiln, with transferway and track connections to elevated and surface lines. There also are freight sidings and a connection to the steam railroad. In the first unit are also included the permanent heating plant and necessary electrical equipment common to the entire project. This first unit was put into partial operation in December, 1923.

The mechanical and electrical service supply of these shops centers in a combined steam boiler plant and substation located on the Broadway, Everett, side of the property. This plant is a brick and steel structure 84 ft. x 79 ft. 6 in. and containing one story and a basement. The ground floor is divided into a boiler



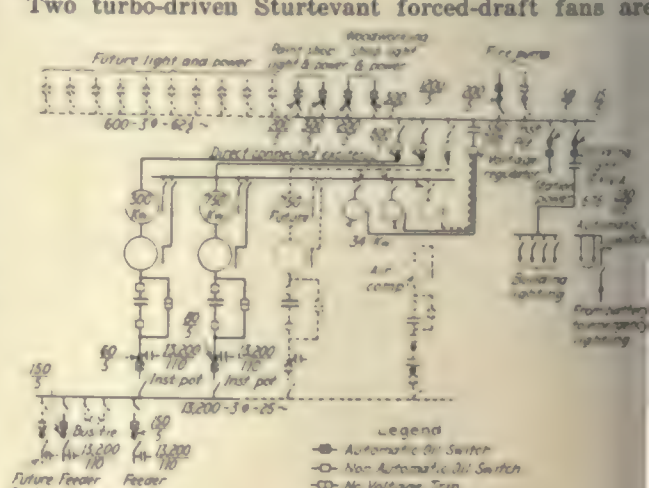

Completed Layout of the Everett Shops

1. Wood shop.
2. Mill room.
3. Carpenter shop.
4. Lumber storage.
5. Dry kiln.
6. Equipment, piping and wiring.
7. Steel car repairs.
8. Blacksmith shop.
9. Sand blast.
10. Paint shop.
11. Paint room.
12. Glass room.
13. Repair shop.
14. Truck shop.
15. Wheel and axle shop.
16. Storehouse.
17. Receiving.
18. Shipping.
19. Oil house.
20. Boiler house.

room and an electrical operating room, the basement being occupied by ash-handling facilities and by low-tension electrical control equipment. The electrical bay on the operating floor extends the entire length of the building and is 29 ft. wide. A spur track connects the company's system with the north side of the boiler house for the convenient handling of fuel, ashes and equipment.

The exposed location of these shops on an open plain in the lower valley of the Mystic River and the extent of the ultimate installation of shops led to the selection of water-tube boilers fired by mechanical stokers for the steam heating plant. The paint shop and wood mill are of concrete, brick and steel construction, with butterfly roofs. The paint shop is 362 ft. 4 in. long x 172 ft. 4 in. wide, the wood mill being of the same length and 157 ft. 4 in. wide. There is space in the boiler house for four boilers set in two batteries in a single row, but the present installation consists of two 369-hp. cross-drum type Babcock & Wilcox units equipped with Taylor stokers and burning bituminous coal. B. & W. superheaters raise the steam 50 deg. F. above saturation temperature. The boilers are designed for 160 lb. pressure, but about 125 lb. will be used for the present.

Two turbo-driven Sturtevant forced-draft fans are



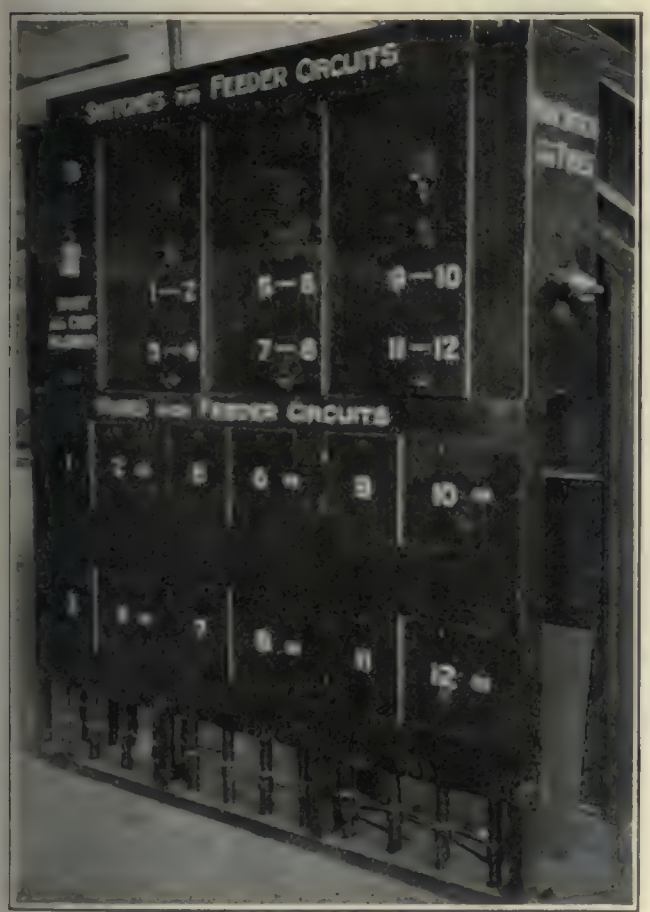

Schematic Wiring Diagram for Power House, Including Provision for Future Additions

installed on the operating floor of the boiler room to supply air to the furnaces. The boilers are equipped with concrete ash hoppers fitted with rolling gates. Ashes are discharged by gravity from the hoppers into an ash car and trackage system in the basement which connects with an automatic skip hoist on the outer side of the building. By pressing a button this hoist elevates the ashes above the boiler houses and discharges them into a 10-ton overhead hopper from which gravity delivery is made into cars on the spur track.

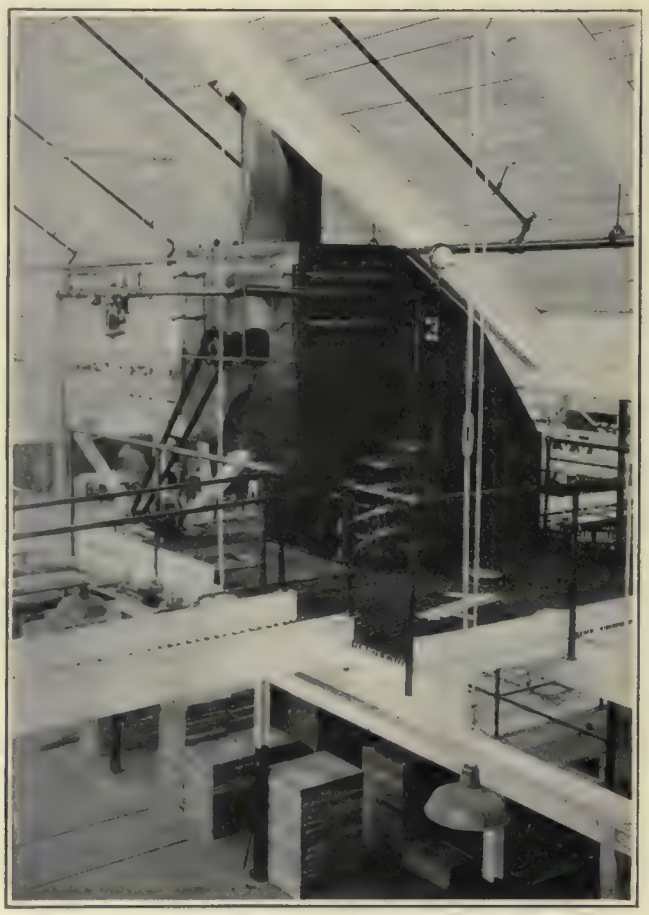
Coal crushed at the company's main generating station is brought to the boiler house in company cars and is dumped into a track hopper under the ash chute, so that when desired the same car can be used to deliver coal and remove ashes. From the track hopper the coal is carried by a belt conveyor to an elevated tower which forms part of a 200-ton storage bunker at one end of the boiler room, whence it is delivered to the stoker hoppers by a motor-driven lorry of the weighing type. The coal and ash handling machinery was installed by the Underwood Machinery Company, Boston.

Two Lee-Courtney two-stage turbo-driven feed pumps constitute the major equipment of this type, but to obtain more economical operation at times of light load on the heating system a Union Iron Works reciprocating pump capable of supplying feed water to one boiler has been installed.

Electrical energy is being supplied temporarily to these shops by the Malden Electric Company, but the installation is designed so that in the near future it will come from the main generating plant of the Boston Elevated Railway. Energy will enter the substation at 13,200 volts, 25 cycles. Two No. 0000 three-phase underground feeders will serve the initial installation, with space provided for a third. These cables enter the substation basement and pass through disconnecting switches, current transformers and General Electric FH-103 500-amp. oil switches and further disconnects to a high-tension bus structure in this room. From the high-tension bus, cable connection is made through similar oil switches on the operating floor to starting compensators and switches controlling two General Electric synchronous frequency converters located in the operating room and designed to transform the 25-cycle, 13,200-volt energy into 60-cycle, 550-volt, three-phase energy for local distribution. One converter is rated at 500 kw. and the other at 750 kw., space being provided for a third unit of the larger rating. Two 34-kw. direct-connected exciters, with room for a third of the same size, are included.

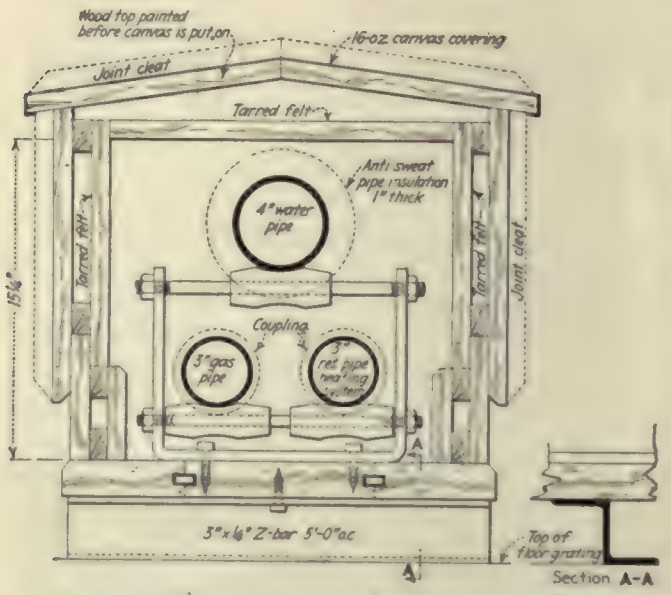



Switchboard for Feeder Circuits, with Fuses Inclosed in Cabinets Beneath



The Ventilating Fan in the Wood Mill Is Installed on a Gallery

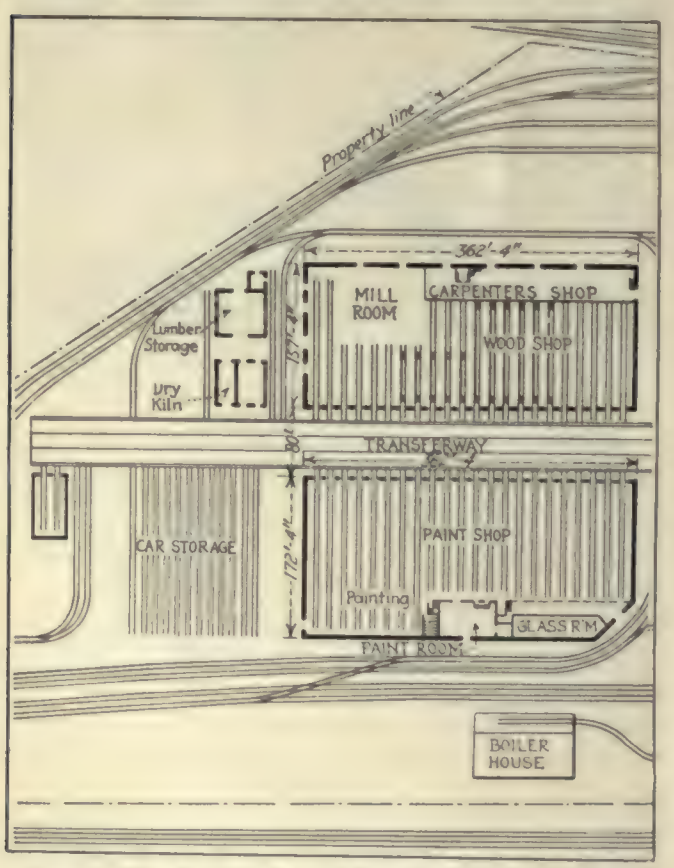
From the generators of the frequency converters connection is made to a 550-volt, 60-cycle, three-phase bus located in the basement, whence feeders are run to the various shops. The switchboard controlling the various equipment, including frequency converters and feeders, is located in the operating room and is of the remote-control type. An "E-9" Exide storage battery of 55 cells supplies direct current for oil switch operation and emergency lighting through an automatic switch installation. The battery is charged from a small motor-generator set in the substation. Space has been assigned in the operating room for a motor-driven air-compressor, but at present air is secured




**The Piping Is Carried Over the Transferway on a Bridge in an Inclosure**

from the company's pipe line system. An Underwriters' fire pump of 1,000-gal.-per-minute capacity is installed, with space for a second unit. The substation is served by a 20-ton Whiting electric crane.

In general the paint shop and wood mill are heated by hot blast fans which force the air across steam coils and discharge it through outlets into the room below at the rate of 1,000 cu.ft. per minute per fan unit. In each of these buildings eight fan and heater coil units are installed. Steam is carried to the paint shop by an underground 10-in. line, with a 4-in. continuation to the wood mill. The latter pipe is carried in an insulated inclosure across a bridge clearing the transferway between the paint shop and the mill. Reducing valves are installed on the supply side of each set of heating coils.




**Layout of Wood Mill and Paint Shop, the First Units of the Everett Shop to Be Completed**

The heaters operate on from 30 to 35 lb. steam pressure. In certain inclosed spaces such as offices and lavatories direct radiation supplements the fan system. The heater units are mounted on the skylight sections to leave the supply of natural light as free as possible. The air in this system can easily be recirculated and fresh air can be introduced freely from outside the shops. The heaters are of the Sturtevant inverted type, 8 ft. 3 in. high x 7 ft. wide, each unit having four discharge outlets at the bottom of the casing and located 18 ft. 6 in. above the floor. The heaters are supported by steel members spanning the space between roof trusses and also by hangers attached to the roof girders. A steel platform around each heater makes inspection and repair work easier. The fans are all motor-driven. A 6-in. return line brings the drips from the heating system to the boiler house for recirculation in the feed water system.

The lumber storage building, two stories high and about 55 ft. x 52 ft., is served by a 3½-in. steam line. The second floor is divided into a series of warm rooms arranged in tiers along two sides of the building with an open space between. In each one of six rooms two sets of heating coils are installed. Each set of coils consists of 168 linear feet of 1¼-in. pipe, affording 72 sq.ft. of heating surface per set, and each set is served by a 1-in. live steam lead and has a ¾-in. return lead to the drip piping.

The dry kiln is heated by the direct two-pipe steam vacuum system. The heating unit is sufficient to build up and maintain a temperature of 150 deg. F. in the kiln while changing the air five times per minute. The fan installation has been made in connection with supply ducts leading from the fan discharge down the center of two trucks of lumber which are run into the kiln loaded on tracks at right angles to the transferway. The return ducts are along the sides of the kiln. A humidifying system provides for the entry of live steam sprays between the heating unit and the fan intake. There are also two lines of pipe extending under each line of tracks so that the lumber may be steamed before beginning the drying process. Various instruments used in testing the moisture content of the lumber, temperature and humidity are installed, with an electrically controlled charging oven for use in studying moisture present in small samples of lumber.

The standard pipe coloring schedule approved by the American Society of Mechanical Engineers is followed in these shops.

## Atlanta Buys Steam from Incinerator

THE Georgia Railway & Power Company has just agreed to buy the excess steam of the garbage and refuse incineration plant in Augusta. It is expected that during the winter months the steam thus bought will be used in the commercial steam-heating system of the company and during the summer months it will be used in the commercial gas plant of the company. The contract is for ten years and provides that the city shall supply 80,000,000 lb. of steam a year, with a set minimum average per day and per hour at 170 lb. pressure.

# Storeroom Improvements at Richmond Save Time and Money

**Stock Has Been Completely Rearranged and New Cases Provided —Heavy Material Is Kept on Raised Platforms—Lift Trucks Save Much Time—Cost of Installing New System Was $5,400**

*By John Y. Bayliss*
Director of Purchases and Supplies Virginia Railway & Power Company
Richmond, Va.

AFTER careful consideration of various methods of providing and conserving materials and supplies for current use, the Virginia Railway & Power Company has adopted the so-called stock-book system, and has installed it in one of its large storerooms. The installation involved not only changes in making and keeping the record of stock, but also a complete rearrangement of the stock itself.

The stock-book form is printed with columns for the usual descriptive information about each article and has also space for recording the amount of each article in stock for each month of the year. Each sheet holds the record for four years. The system depends upon a complete inventory once a month, so that requisitions can be made with definite knowledge of the amount of each article on hand. To make possible such an inventory with reasonable expense, the stock must be visible on the shelves and must be stored in such shape that to a large extent it can be counted without handling. Although annual inventory has always loomed as an ominous cloud on the storekeeper's horizon, the monthly inventory can be made in a comparatively short space of time and without extra help. Paradoxically, what was a great bugaboo once a year, now that it comes once a month scarcely makes a ripple on the smooth surface of the affairs of the storeroom.



**Material Is Piled in These Cases so It Can Be Counted Without Handling. The Stock in the Two Cases Here Shown Can Be Counted in 40 Minutes. Gas Steam Radiators Are Used for Heating the Storeroom.**

The Richmond storeroom contains supplies for both railway and light-and-power service. For convenience in arranging the stock and keeping the records, the materials have been classified according to use and physical characteristics. There are 77 classes of material in this storeroom. The material is listed in the stock book and placed on the shelves and floors in comformity to this classification.

The typical material case is made of dressed lumber and is 22 ft. long and 10 ft. high. It is 4 ft. 4 in. wide at the base and 2 ft. wide at the top. At a height of 3 ft. from the floor there is a shelf 8 in. wide on which the men stand to reach the bins at the top. The case is divided equally by a galvanized wire partition of ¾-in. mesh and No. 14 gage running lengthwise and from top to bottom through the middle. From this the shelves open on both sides. Such a design admits plenty of light and makes it possible to see through the shelves from one side to the other. The case is painted white inside and out with two coats, the last coat being enamel for a hard, glossy finish.

Each bin or pocket has a small galvanized metal card holder, on the front in which is inserted the number and description of the contents. The cases are separated by aisles 3½ ft. wide. Experience has proved the aisles should be not less than 4 ft., or better still 4½ ft., in width if the space is available. As far as practicable, the materials are piled in multiple units to facilitate counting and handling. Small articles are put up in packages containing the amount usually issued on requisition. The articles are packed thus by the makers, if the material in that form can be purchased economically. If that cannot be done, packages are put up by the storeroom clerks when they are not otherwise engaged. This method has advantages over the unit-piling system, because it not only facilitates the inventory, but also aids the issuing of the material.

## Appearance of the Richmond Storeroom of the Virginia Railway & Power Company After Rearrangement









No. 1. Material cases for storing boxes of glass.

No. 2. How gear wheels and galvanized pole-line hardware are stored at Richmond.

No. 3. An average of 100 requisitions are filled over this disbursement counter daily involving approximately 250 pieces of material.

No. 4. Steel tubing and sheet steel are stored in these racks.

No. 5. Receiving room where all freight, express and small shipments are received. The overhead hoist is a spur-geared block with chain fall, supported from the roof timbers.

No. 6. Machine of 2,000-lb capacity used for stacking heavy packages. Note the aisle marked by white lines.







Concrete Platform for Storing Heavy Reels of Cable and Large Transformers. Two-Ton Reels and Large Transformers Can Be Easily and Quickly Loaded and Unloaded from This Platform

A section of the storeroom has been set aside for receiving and checking material delivered. It is inclosed by a partition, the lower part of which is of wood and the upper part of wire-mesh screen. It can be locked off from the remainder of the storeroom. Here deliveries are received and inspected before the material is placed in stock. Such a section adds to the orderly operation of stock receiving and prevents premature issues of materials that have not been accepted and accounted for. A locker section also is provided for articles in suspense, such as goods rejected, incorrectly shipped, or not identified by proper shipping papers.

Another section has been built for issuing materials on requisition. It consists of a wooden counter surmounted by a wire-mesh partition. The man with a requisition presents it at this counter and the clerk brings him the material required. There is a gate with a latch which can be opened to pass out bulky articles not easily issued over the counter. The tendency for men from other departments to enter or pass through the storeroom, either on business or otherwise, is thus prevented.

Special cases have been built for storing pole-line hardware, gear wheels, glass, sheet metal, tubing, etc. Such articles, being bulky or inconvenient for shelf storage, heretofore were piled on the floor, resulting in wasteful use of floor space and improper protection of the property. Putting the material in cases saves storage space, makes it more accessible, and presents withal such an improvement in the appearance that even the men who handle the stock have more respect for its importance and value.

Transil oil is stored separately in an isolated metal house with concrete floor. The drums are thus protected from moisture, and small transformers can be filled under cover. Lead-covered cable and heavy transformers are placed on a concrete platform level with the body of the delivery truck. This convenience has greatly reduced the time, labor and cost of receiving and issuing these heavy stores. Fiber duct for underground conduit, although expensive material, has usually been piled on the ground, resulting in damage and inconvenience. It is now stocked neatly in racks made of cedar posts 12 ft. high, with the tops tied together by wire.

Reels of weatherproof cable and other heavy supplies for inside storage are unloaded on small, portable platforms and moved to position in the storeroom by lift trucks. When the lift truck is removed, the platform rests on the floor with the load on it, where it remains until issued for service. The lift trucks have a capacity of 3,500 lb. and cost $150 each. By their use a carload of heavy reels, each weighing 1½ tons, can now be received and stored without extra help in less than an hour. Formerly, it took half the day for a gang of men to do the same work. Moreover, the stock is in such position that one man with a lift truck can wheel it to the door of the storeroom, where it is quickly lifted to the delivery truck by an overhead hoist. A reel or transformer can thus be issued almost as quickly as a hand package.

### Improvements in Handling Methods

Heavy cases of electric equipment, kegs of track material, barrels of insulators, and similar packages which can be stacked, are piled one upon another by a stacking machine or portable elevator, which costs $334. By this means floor space is saved and the property is better protected against damage. The floor for such heavy stores is divided into sections, and aisles 4 ft. wide lined off by white paint give access to the stock.

The time and expense required for installing the



Lift Trucks Having a Capacity of 3,500 Lb. Each Are Used to Handle Heavy Material. When in Position the Truck Is Lowered and the Platform Left in Place with the Load on It



Fiber Conduit Is Stacked in Open-Air Racks. These Are Made of 12-Ft. Cedar Posts Having the Tops Tied Together with Guy Wire



Main Storeroom Showing "Daylight" Cases for Material. The Unit System of Piling Is Used to a Limited Extent. Cases Are Painted White

system were moderate. In the Richmond storeroom a period of 17 months has been taken to lay out the work, tear out the old shelves and material cases, make and set up the new cases, rearrange all the stock, and write up the stock books. With this ample time allowed the change was made gradually. A few cases were built, or a small section was remodeled, at a time, thus avoiding disturbance of the regular routine in the storeroom. After each new case was installed, the material was placed in order on the shelves, following as closely as possible the adopted classification. When the cases had been in use long enough to insure satisfactory arrangement of the stock, the items were written up in the stock book in the order found on the shelves, and the work of installing the new system was done.

### CHANGE MADE AT SMALL COST

In this storeroom about 5,000 different articles of stock are carried, of which 4,800 are stored in the building and 200 outside in the open air. The total value of the stock is about $260,000. The cost of installing the stock-book system, including new hoisting and trucking equipment, new material cases, and the salary of an additional clerk for part of the time, is $5,400, distributed as follows:

| | |
|---|---|
| Taking out old material cases and setting up new cases complete | $3,95 |
| Stock books and forms | 15 |
| Portable elevator, lift trucks, etc. | 87 |
| Additional clerk for six months at $70 per month | 42 |
| | $5,40 |



Locker Used for Storing Materials in Suspense, Such as Articles Rejected on Delivery or for Which the Proper Identification Has Been Delayed

This system has not been in service long enough to draw final conclusions as to the economy and other advantages realized. It is probable the benefits will not be reflected fully in the operating figures when available. It is nevertheless confidently expected that the new system will enable the stores department to supply the needs of the company more effectively, with a smaller investment in general supplies and with no greater expense in operating the storerooms. Some indirect benefits already appear evident. There is a better arrangement of the stock in the storeroom with smaller floor space occupied. Quicker service is given in receiving and issuing supplies, with better provision for protecting the stock from damage. The discovery and disposition of obsolete and surplus stock are made more frequently and effectively than heretofore. The good effect on the minds of the personnel, because of more perfect order and a better system of storing and handling materials, is apparent.

## Overhead Test Material Painted Red

THE Department of Street Railways, Detroit, is following the practice of painting red all overhead material on test. This color attracts the attention of the line crew, which may remove this particular article so that it will be brought into the office for examination and reinstallation. Another advantage noted is that, as all test material is checked periodically until worn out or a condition is reached which makes replacement desirable, the red color makes identification easy and positive. A brief reference to this practice was published on page 88 of the issue of this paper for July 19, 1924.

# D. U. R. to Operate Co-ordinated Rail-Bus System

## Bus Lines Now Paralleling Interurban System Will Be Co-ordinated with Rail Service to Give Alternate Bus and Electric Car Service on Frequent Headway

PLANS of the Detroit United Railway to co-ordinate with its railway service the bus lines which operate on the highways paralleling practically all of its routes are rapidly nearing completion. The consummation of these plans will mark the end of the destructive competition which followed the completion of paved state highways, and which became very serious during the first half of the current year. Acquirement of the bus lines by the railway will permit bus and rail schedules to be staggered so as to give maximum frequency of service without the useless and wasteful duplication that has existed up to this time.

Along with these plans relative to service outside of Detroit, a novel and interesting terminal project within the city is expected to be in operation within a short period. In this case buses will be used to haul interurban passengers between terminal stations at the outskirts of the city and the present downtown interurban terminal. An earlier brief outline of this terminal plan was given in this paper, issue of Nov. 15.

Bus competition with the lines of the D. U. R. started in 1919, shortly after the completion of the paved road, between Mount Clemens and Detroit. Another bus line was put into operation, paralleling the division from Pontiac to Detroit. Although this competition began to be felt almost immediately it was not serious, due to the higher bus fares and also to the character of equipment operated by the bus men. As bus operation was extended so that these vehicles paralleled other divisions of the railway, passenger revenue continued to fall off. However, this loss was partially offset by increased earnings from intensive development of freight business.

The continued pressure resulted in various operating economies on the railway. Chief among the measures adopted was the increased use of one-man operation on local lines and within some of the communities served. Some of the existing equipment was remodeled for one-man operation and additional new cars of this type were purchased. When the changes, which are still under way, are all completed, there will be between 150 and 175 cars of this type in use on the property. It is estimated that this program alone will make a saving of approximately $500,000 per year.

In the spring of the current year, the situation arising from the bus competition became acute. Improved bus equipment and more frequent service made more serious inroads on the railway receipts. As this more frequent bus service was met by increased service on the rail lines, a fare war ensued, which rapidly brought matters to a climax. In some cases, bus fares were cut as low as 1 cent per passenger-mile, and these cuts were met by the railway. Such low fares induced some additional riding, but the increase was far from enough to compensate.

Improved bus equipment and more frequent service were also put in on some of the long-distance routes paralleling the railway lines between Detroit and Port Huron, Flint, Toledo, and Ann Arbor. A further loss in railway revenue resulted, and during the first 5 months of the current year the railway receipts were no more than sufficient to pay actual operating expenses and fixed charges only.

Practically all of the competing bus routes had been granted certificates of convenience and necessity which amounted to franchises. Although the Michigan Supreme Court has ruled that the commission must ignore the service of existing steam and electric railway lines in determining the public convenience and necessity in connection with the granting of bus permits, the existing bus route is taken into consideration in passing on an application for a second bus line on the same route. Consequently, purchase of the bus lines seemed to be the only course left open to the D. U. R. to offer some assurance of eliminating destructive competition and give a co-ordinated service.

A subsidiary company, known as the People's Motor Coach Company, has been chartered to operate the railway buses. New financing to the extent of $2,000,000 has been approved by the commission, and this money will be used to cover additions to railway equipment, purchase of existing bus lines and extension of routes to give through bus service between the important cities of the state.

Where bus routes parallel the railway lines, a staggered headway will be arranged so that alternate bus and car service will be given. On the lines between Mount Clemens, Pontiac and Detroit, both cars and buses will be operated at intervals of 30 minutes, so that there will be 15-minute headway between alternate cars and buses. Thus a very convenient service will be given, but present needless duplication of service will be eliminated. The economies expected from the elimination of wasteful duplication are estimated to amount to $500,000 per year. Thus the combined result of one-man operation and the co-ordination of cars and buses is expected to make operating savings of approximately $1,000,000 per year.

Although bus and rail fares on some of the shorter lines were on the same basis and were very unprofitable, those charged by the buses on some of the longer lines were higher than rail fares. On the line between Flint and Detroit the railway fare is $1.58. Parlor cars are operated on this line and also on some of the other important divisions of the railway, and an additional charge of 50 cents is made. This parlor car service has proved to be both popular and profitable. The bus fare for a trip between Flint and Detroit has been $2. The company considers these fares to be on an equitable basis, but the fares on some of the shorter routes where competition forced the rates down to a basis 1 cent per passenger mile are not sufficient to meet the costs of operation even after the service is co-ordinated. On these routes application has been made to the commission for increased rates.

The terminal situation at Detroit has for some time been the source of considerable loss to the D. U. R. Within the city the interurban cars operate over the tracks of the city-owned street car system, and the speed is necessarily slow, with frequent stops that are annoying to through passengers.

During the year 1923, 9,250,000 passengers were carried into the city on the D. U. R. cars. This is considerably less than the total number of passengers that are brought in to the city limits, as many people leave the cars at the outskirts of town and ride the jitneys to the business district because of the saving in time that can be made. Others take the city street cars at the

city limits, so as to be able to transfer to other points than the business district for the same fare, and with no loss of time over the interurban cars.

The D. U. R. collects a 6-cent fare for the ride from the city limits to the downtown terminal. Operating expenses on the cars average about 27 cents per car-mile, and the fare collected just about meets this cost. During the year 1923 this operation within the city amounted to about 2,000,000 car-miles. The charge made by the city for the use of its tracks amounted to $500,000, and as this was in addition to other operating costs, it represented a net loss on the operation of the interurban cars in the city area.

To avoid this loss, buses will be used to haul passengers from the outskirts to the center of the city. Four terminals are under construction, one on each of the main divisions of the D. U. R. lines. At these terminals, passengers will be transferred to the buses. In this way, a saving in time for the trip of between 20 and 30 minutes will be made, and it is expected that many people who now use the jitneys to make this saving will transfer to the buses. The revenue from the bus operation is expected to pay the entire cost, and thus a material saving will be made in comparison with the operation of interurban cars to the center of the city. The buses will operate express between the terminals and the business district and will do no local business.

The installation of the terminal bus service will be made gradually. For the present, parlor car trains will continue to operate into the center of the city over the street car tracks, so that passengers will have the option of transferring to the buses or continuing on the cars to the downtown terminal.

Hearings before the commission on some of the phases of the new plan are set for the latter part of November, and it is expected that if the commission approves, the co-ordinated operation will be started during the month of December.

# Accident Costs Reduced 1.56 per Cent of Gross Earnings*

### The Plan Adopted by the Memphis Street Railway a Year Ago Has Already Resulted in a Saving of Approximately $50,000, of Which the Trainmen Have Received Half

THE management of the Memphis Street Railway after trying various accident reduction plans, such as individual bonuses, prizes, etc., became convinced that the best plan would be one by which the savings in the cost of accidents would be divided between the company and its employees. Plans based on individual performance were thought to have a tendency to discourage the making of full reports of all accidents. On the other hand, a plan based entirely on the actual reduction in accident cost was thought to be free from this objection.

To make such a plan successful it was necessary to devise a method of determining accident costs within a short time after the occurrence of the accident. Previous experience indicated that damage claims were ordinarily settled or a lawsuit was brought within 60 days. Moreover, statistics running back over a period of years showed that the ultimate cost of all litigati was 6 per cent of the amount sued for.

With this experience in mind a new plan was into effect on June 1, 1923. The actual amou expended each month in the settlement of claims, p 6 per cent of the amount sued for during that mon was considered to be the accident cost for the mon For two years prior to June 1, 1923, accident co had averaged 4¼ per cent of the gross earnings the railway. The difference between this figure and t accident cost, figured as described above, would the savings under the new plan and would be divid on a 50-50 basis between the company and the men.

It was decided to make the award periodically eve three months, the men's share to be prorated on basis of hours worked, no man participating who w not in the service of the company on the last day the three months' period. If at the expiration of a period the cost exceeded the 4¼ per cent of gross, t excess was to be absorbed during the next period bef any dividend was paid. Under this arrangement bonus was paid unless there was an actual saving to t company.

The results obtained during the past year have be as follows:

| Period Three Months Ending | Total Saving | Trainmen's Share |
|---|---|---|
| Sept. 1, 1923 | $12,244 | $6,122<br>or 1.75 cents per man-h |
| Dec. 1, 1923 | 8,762 | 4,381<br>or 1.27 cents per man-h |
| March 1, 1924 | 10,128 | 5,064<br>or 1.45 cents per man-h |
| June 1, 1924 | 15,240 | 7,620<br>or 2.10 cents per man-h |

During the year ending June 1, 1924, the total nu ber of accidents was 2,716 or a reduction of 7½ per c from the number the preceding year, which was 2,9 The total cost of these accidents was 4.03 per c of gross earnings, as against 5.59 per cent the ye before. This reduction in the number of accidents w obtained in spite of the fact that the number of au mobiles on the streets of Memphis increased to per cent.

It has been found that this plan not only lesse the number of men requiring disciplinary action, also makes the administration of discipline much eas and more satisfactory. On the first Tuesday of e month a meeting of the officials of the transportati department, the carmen's union and the claims depa ment is held. All matters pertaining to safety operation are then discussed. On the second Tuesd two meetings are held, one for the day trainmen a one for the night trainmen. At this time a discussi is held of the operation during the preceding mon good work of certain individuals is commended, a failures pointed out in a manner calculated to impro the operation. About three-quarters of the total nu ber of employees attend these meetings.

The chief advantages of this plan have been fou to be that it encourages the full reporting of all ac dents or happenings, no matter how trivial. It a encourages politeness and courtesy on the part of t employees and stimulates their efforts to increase t gross revenue of the railway. Moreover, it promot friendly feeling between the trainmen and the co pany and makes the administration of discipline eas as the majority of the men do not wish to have carele indifferent or incompetent men retained in the service

*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.



Bus Making Connection with Car Under the Co-ordinated Service Plan of the West Chester Street Railway

# Transportation Service Co-ordinated in Southeastern Pennsylvania

**The Acquisition of 11 Bus Lines and 8 Miles of Rail Route Has Enabled the West Chester Street Railway Greatly to Extend Its Operations and Population Contact — The Company Has Been Relieved of Paving Obligations—Railway Is the Backbone of the Bus Development**

DURING the past 18 months the West Chester Street Railway, West Chester, Pa., has added to its system 8 miles of electric railway lines formerly belonging to other companies, and has acquired nearly 200 miles of non-competitive interurban motor bus routes. The unified system serves approximately 1,000 square miles of populous and fast-growing territory in southeastern Pennsylvania and northern Delaware. A map of the system appears on another page.

By the acquisition of these bus and rail lines the company has added substantially to its earning power at comparatively small expense, by bringing large sections of populous territory, heretofore isolated, into direct contact with its railway system. Although the unified system as shown on the map has been established only a few months, the company is obtaining regular traffic on its railway lines from territory which in the past, without bus connections, yielded only occasional revenue. Judging from these satisfactory results, it is thought that with proper co-ordination of service and the use of comfortable and attractive equipment and adequate advertising to inform the public of facilities afforded, the volume of traffic carried on both railway and bus systems will be further increased.

In addition to the income from scheduled bus service, considerable revenue is derived from the sale of gas and oil, private automobile storage and from the hire of buses by private parties for sightseeing trips and other purposes. The company considers the latter class of business susceptible of large and profitable development on account of the flexibility of the bus and the character of territory, which is rich in points of historical and educational interest and gridironed with concrete and hard-surfaced roads.



Some of the Picturesque Territory Through Which the West Chester Street Railway Operates Its Interurban Service

The West Chester Street Railway was incorporated in 1890. It owns and operates two interurban lines aggregating about 37 miles of single track. One extends north and west from the Borough of West Chester, the county seat of Chester County, to Downingtown and Coatesville, a

distance of 15 miles. The other extends south and west from West Chester to Kennett Square, Avondale and West Grove, a distance of more than 21 miles. Connection is made at West Chester with the Philadelphia & West Chester Traction Company, giving direct and frequent service to Philadelphia.

The northern division of the railway serves an important industrial section of Chester County, centering in Coatesville and Downingtown. Between these points the route is along the Lincoln Highway and parallels the main line of the Pennsylvania Railroad. Because of the present housing shortage and the character of territory, this district seems destined to have considerable residential development. The southern division, operated from West Chester through the Brandywine Battlefield district and Lenape Park, a popular summer resort, to Kennett Square and West Grove, serves not only the local interborough traffic in southern Chester




**Railway and Bus Routes, Locally Known as the "Chester Valley Lines," Serve an Area of 1,000 Square Miles**

County centering in Kennett Square, but also the through traffic to the county seat and to Philadelphia.

Prior to 1923 the railway's southern division terminated at Kennett Square. In that period the Kennett & Wilmington Electric Railway, an independent company, operated two divisions, one extending west from Kennett Square, a distance of 7½ miles through a well-developed section to the neighboring towns of Toughkenamon, Avondale and West Grove, while the second extended south a distance of 14 miles through rural territory to Brandywine Springs on the outskirts of Wilmington. Losses on this rural division more than offset the gains on the interborough line between Kennett and West Grove, with the result that service was abandoned in the spring of 1923.

About this time Kelly, Cooke & Company, engineers, Philadelphia, for many years associated with transportation work in southeastern Pennsylvania, acqu control of the West Chester Street Railway. The management promptly took steps to secure the p able section of the railway formerly in operation Kennett to West Grove, and by this means to o not only the local traffic between these points, but the additional through six-fare business to the co seat from points in the southern part of the co The property was taken over in October, 1923, reconstruction work was immediately undertaken.

Traffic on the West Chester-Kennett division was duced primarily by the terminal populations at Chester and Kennett Square, and secondarily, by connecting railway lines to West Grove and Brandy Springs. This feeder service for years had been h capped by irregular operation, due to derailm and other causes. Unsatisfactory as this conne service had always been, it was utilized as a matt necessity and brought consider "county seat traffic" to the Ke division of the West Chester S Railway.

The line from Kennett to Grove has now been reconstru through service having been ina rated in July, 1924. The anno necessity of transfer at Kennett been eliminated and a great imp ment in the regularity of service the character of the equipment been effected. The company equipped nearly all of its cars luxuriously upholstered seats bu order by the Hale & Kilburn pany. Seating accommodations clude swivel armchairs, which proved a popular innovation. marked increase in pleasure r which has occurred is attribute the management to the pleasant ing qualities of the new seats. interior view of the improved c shown in an accompanying illu tion. Present indications are the increased passenger revenu the extended Kennett division wi approximately three times the crease in operating expenses fixed charges.

Another important phase of situation is that under ordina enacted by the city of Coatesville and the Borough Downingtown, West Chester and Kennett Square company has been permanently relieved of former ing obligations in these communities. Typical sect of paved track, which has practically all been re with heavier rail sections in concrete or permanent are shown in accompanying pictures. Except in t towns the tracks are nearly all on private righ way and are unpaved.

Recently the company has also acquired abo mile of paved track extending from the terminu its line in Coatesville, south on First Avenue to plant of the Bethlehem Steel Company. This exte will permit the operation of a more frequent se along the main street in Coatesville, and will e the company to gain considerable local revenues he fore lost on account of the 30-minute headway of

nterurban service and of its inability to handle the ndustrial traffic to its final destination.

The First Avenue track was formerly the property f the Coatesville Trolley Company, organized to con- truct an electric railway from Modena (about 3 miles outh of Coatesville) north through Coatesville to Honey Brook. About $80,000 was spent in constructing he First Avenue track before funds were exhausted nd the project abandoned. The track, which has never een in operation, is constructed of 90-lb. girder rail et in concrete, with a diamond turn-out centrally ocated, and was obtained by the West Chester Street ailway on most favorable terms.

### When and How Bus Lines Were Acquired

On account of the location of the railway system n relation to the communities which it serves, and o connecting highways leading to near-by population enters, the inauguration of a supplemental bus service as seen to be necessary to increase and stabilize ailway revenues through an enlarged and diversified opulation contact. While the management considered hat the construction of new electric railway lines con- ecting certain sections of the territory would in the nd be more profitable than buses, it was found that his would have required extensive construction along arts of the primary concrete highways for which ranchises would be difficult, if not impossible, to btain. For this reason decision was made to utilize he bus as the most immediately available substitute.

As an initial step in the execution of its plan for a o-ordinated railway and bus service the West Chester Street Railway in June, 1923, bought control of the Peoples Transportation Corporation. This was a small ompany organized in 1920 to operate buses on the Baltimore highway between Media, the county seat f Delaware County, and Kennett Square, and also etween Concordville and the city of Chester. In pur- hasing the Peoples Corporation, the railway accom- lished several objectives at one stroke. A going ompany was thus acquired through which to operate he railway's buses, and control obtained of routes ntering the populous Chester district from the north- vest via the Concordville concrete highway. The ailway was also placed in a good position for acquiring us routes into Wilmington.

In October, 1923, the routes from Kennett south to he Delaware and Maryland lines, together with others n the city of Wilmington, were granted to the Peoples Transportation Corporation, thereby placing under one



Parlor Cars Equipped with Revolving Armchairs Are Inducing Pleasure Travel

management all bus transportation between the bor- oughs of southern Chester County and Chester and Wilmington.

In northern Chester County the same company also acquired by purchase a route extending from Down- ingtown east on the Lincoln Highway to Exton, thence northeasterly through several small villages to Phœnix- ville, an important industrial center. Pending the acquisition of other routes in this territory, this resulted in a franchise covering the entrance to Down- ingtown (a railway terminal point) and also to the principal borough in the northeastern section of the county.

### Acquisition of Other Franchises Has Extended Population Contact

Franchises have also been obtained covering the Lin- coln Highway from Downingtown through Frazer, Malvern, Paoli and Devon to Strafford, connecting there with the Philadelphia & Western Railway, operating a 20-minute high-speed electric service to Philadelphia. The route from Strafford to Valley Forge National Park and Phœnixville has also been secured to develop pleasure travel to that historic point. This route, passing through a region of great natural beauty, offers a very attractive and convenient means of reach- ing Valley Forge from Philadelphia.

Other franchises granted to the company are those between Norristown and Phœnixville and between



Coatesville, Terminal Point of the Railway System



A Section of the Railway in Downingtown

Phœnixville and the near-by boroughs of Spring City and Royersford, which gives to this important district the advantages of a permanent and unified bus transportation system. Following the acquisition of these franchises the corporation obtained the right to extend its Phœnixville line and also its Chester line into West Chester (the railway terminal), thus completing the unified system. The effect of this has been to bring large sections of population, heretofore isolated, into contact with the railway, thus aiding materially the development of long-distance riding on the railway. It has taken about 18 months to establish the various bus lines and the railway extensions.

As of November, 1924, the Peoples Transportation Corporation owned and operated 21 motor buses of seating capacity ranging from 12 to 30 passengers. It is planned by the West Chester Street Railway still further to improve its equipment and extend its facilities to permit of more economical centralization of maintenance work.

### Extensive Use of Advertising

While each route has been placed in operation as acquired, it has only been within the past 2 months that the company has been in a position to advertise the service as a whole, due to the necessity of first modifying the original schedules of each route and coordinating them with the requirements of a unified system of operation. The management estimates that it will take about a year of "cut and try" to fit these to the public need and fully to develop the traffic potentially tributary to the lines.

One form of advertising which has produced results is shown in an accompanying illustration. As another means of informing the public of its service facilities, the company publishes a standard form of time-table for each railway and bus line with a map of the system, and giving telephone numbers throughout the territory through which further information can be obtained. These booklets are placed in multiple pocket schedule boxes located at advertised points and in all railway cars and buses. Large numbers of schedules are also being constantly sent through the mails upon request, it being considered that every inquiry or schedule taken represents a probable patron. The company has also issued an attractive illustrated folder describing many points of historic and educational interest in the territory served by its lines, which is particularly rich in its Colonial history.

### Public Relations

One of the interesting results of the company's constructive program has been the complete reversal effected in public sentiment. Whereas formerly this had been decidedly antagonistic, there now appears to be a friendly feeling and a good word on every hand for what the company is accomplishing in the way of property and service betterments. An editorial in the Coatesville *Record*, entitled "Pleasing the Public," shows how the public responds to genuine efforts to make traveling more pleasant and comfortable. This editorial said in part:

> Credit must be given officials of the West Chester Street Railway for the manner in which it is serving the public.
>
> The present management of the trolley company apparently realizes that it prospers most when it gives the best possible service, and there is plenty of evidence that it is spending both energy and money in its plan to render such service. Improvement in tracks and roadbed, remodeling and renovating of trolley cars, additions to service through more cars and better schedules—these have gone a long way toward bringing to the company a hearty public support which it must be admitted was entirely lacking only a few years ago. This condition is shown also on the motor bus lines operated by the same company.

### Large Tributary Population

The total population of the territory in contact with the bus system is 336,423, and with the co-ordinated railway and bus system 359,517. Of this 93,194 is in Chester County; 68,352 in Delaware County; 70,83 in Montgomery County, and 127,137 in New Castle County, Del. This population is only that of the territory in direct contact with the railway and bus lines and does not include any part of the large populatio




Advertising the Special Trip Service

between that territory and the western boundary of the city of Philadelphia. The latter district is directly connected by seven high-speed electric lines with Philadelphia, containing more than 2,000,000 people. All these lines enter the Union Terminal Station at Sixty-ninth Street, which is also the terminus of the Market Street subway and elevated lines of the Philadelphia Rapid Transit Company. There are about 190,000 people living in the intermediate territory west of Philadelphia, which is the most rapidly growing district adjacent to the city. A large part of this population lies immediately to the east of the bus terminal and is tributary in varying degrees to the bus lines by reason of connecting railways which traverse this territory en route to Philadelphia. The population per mile of route for the bus system is 1,780, and for the railway alone, 1,320, which indicates the extent of possible future development of the traffic.

Demands for service to accommodate parties for special trips for distances varying between 10 and 20 miles are frequent and increasing. It has been impossible heretofore, owing to lack of equipment, to furnish this service except in occasional instances, but plans are going forward actively to provide for it. With the intercommunity activities in this territory and its richness in points of historical and educational interest, it is believed that revenues from this class of service are subject to considerable development.

# Association News & Discussions

## Iowa Association Discusses Maintenance

### Track Construction, Automatic Substations, Bus Operation, Equipment Maintenance, Electric Welding and Lubrication Furnish Subjects for Fall Program and Lively Discussion

APPROXIMATELY 100 members of the Iowa Electric Railway Association assembled at Des Moines on Nov. 13 and 14 for a busy two-day session devoted to a discussion of many operating and maintenance problems. Comparison of practice and exchange of experiences helped to make the meeting particularly valuable to the operating men present from the standpoint of furnishing fresh inspiration and many practical ideas for modernizing.

In addition to strictly railway subjects, the bus also was taken up in one paper, and the discussion showed plainly that many of the railway men present are actively interested in this vehicle for the transportation of passengers, and are rapidly accepting the idea that the electric railway companies of Iowa are the logical agencies to control and operate transportation lines on the highways of the state.

The meeting was opened by chairman John Sutherland, master mechanic Tri-City Railway. Track construction, automatic substation operation and maintenance and bus operation occupied the first morning session. The afternoon was spent inspecting the various departments of the Des Moines City Railway and the Des Moines & Central Iowa Railway. The second business session took up the subjects of equipment maintenance, welding practice and lubrication. The entire association was entertained at luncheon as the guests of the management of the Des Moines City Railway, and an evening banquet completed a full entertainment program.

A paper by M. W. Freund, superintendent of way and structures Tri-City Railway, Davenport, on the construction and maintenance of street railway track, is abstracted elsewhere in this issue. In the discussion of this paper, R. H. Findley, superintendent of track and roadway Omaha & Council Bluffs Street Railway, said that in Omaha the railway company is trying to unload its paving burdens. He cited some examples of maintenance problems in Omaha, and said that the tendency toward lighter rolling stock equipment was giving the track department relief in two ways: First, in making it possible to construct at less expense new track that seems to stand up satisfactorily under lighter equipment; second, in cutting down the wear and tear on track now in the street. He also said that the use of modern tools like pneumatic tamping equipment, by improvement in tamping, make it possible to cut down somewhat the thickness of ballast required. He favored a sand cushion only in preference to sand and cement under brick pavement, but pointed out that the results obtained depended largely on the local drainage conditions.

Some results obtained from the use of a new quick-hardening cement called Lumnite were described by W. L. Wilson, chief engineer maintenance of way Des Moines City Railway. Mr. Wilson said that this material was extremely handy for patchwork and for concreting short stretches where quick hardening made it possible to allow traffic on the new material after a very short interval. Later in the program, the chairman, at the suggestion of Mr. Wilson, called on Mr. Campbell of the Atlas Lumnite Cement Company to describe some of the properties of this new material which it is putting on the American market.

Track joints were held to be the critical part of the track construction by C. M. Feist, master mechanic Sioux City Service Company. He said that the receiving rail gets a severe hammer blow unless the joint is perfectly level and smooth, and stressed the importance of grinding joints until they are in this condition after welding. Mr. Jameson, of Jameson-Ross Company, said that most track men considered it good practice to grind all joints when laying new rail. Mr. Freund said that the practice in Davenport is sometimes to make the joints slightly above the rest of the rail and then to grind them level.

In a discussion of the use of fillers in brick pavement near the rail, F. V. Skelley, assistant manager Tri-City Railway, cautioned against the use of materials that would flake off and cause derailments. Mr. Findley thought that pitch had been used in the case cited, as he held that it would flake off in cold weather, but that a good grade of asphalt filler would not cause trouble from this source.

"Experience in the operation and maintenance of automatic substations" was the subject of a paper by D. H. Nail, superintendent of power Des Moines City Railway, which is abstracted elsewhere. In the discussion it was pointed out that relief from labor difficulties, as well as elimination of the expense of attendants, was one of the most outstanding advantages of automatic operation.

W. G. Lamb, master mechanic Waterloo, Cedar Falls & Northern Railway, read a paper giving the experience of his company in the operation and maintenance of buses. In 1922 the Johnson Motor Bus Company, operating on the paved road between Waterloo and Cedar Falls, was taken over by the railway and modern 25-passenger buses were put in service on a 30-minute headway between 6:30 a.m. and midnight. A new garage was erected adjacent to the car shop with facilities for the proper inspection and maintenance of the bus equipment. The bus fleet averages between 800 and 1,000 miles per day. The master mechanic has charge of the maintenance of buses as well as railway equipment, and the operation of the new service was placed in charge of a supervisor of bus operation, reporting to the superintendent of the property. The careful records kept give a complete history of the performance of each bus. Facilities for filling the buses when they go out in the morning were installed. Special tanks of 40 gal. capacity enable the buses to operate the full day without refilling.

Attention is given to the appearance of the buses and the drivers are trained in courtesy. Co-operation between the operating and mechanical departments enables small operating troubles to be remedied before they become serious and tie up equipment. Maintenance cost between Jan. 1, 1924, and September 30, 1924, amounts to approximately 7.1 cents per bus-mile, made up as follows:

| | |
|---|---|
| Superintendence of maintenance | $0.00161 |
| Repairs to bus bodies | .00381 |
| Repairs to chassis | .00854 |
| Repairs to transmission | .00073 |
| Repairs to engines | .01023 |
| Repairs to ignition and lighting | .00285 |
| Painting and varnishing | .00168 |
| Tire renewals | .01283 |
| Bus depreciation | .02828 |
| Maintenance of garage | .00049 |
| Total | $0.07105 |

Total operating expenses of the bus fleet per bus-mile were placed at 15 cents.

Tire performance is watched closely and an average of 23,000 miles, with a maximum of 48,000 miles per tire, is obtained. Bus overhaul periods are fixed by the condition of each bus after a careful inspection rather than on a predetermined mileage, and wide fluctuation in the mileage between overhauls is obtained on different individual pieces of equipment of the same manufacture. Buses that have been overhauled and have made a total of close to 200,000 miles are still found to be in first-class operating condition, Mr. Lamb said. He emphasized the importance of careful attention to the little items of maintenance as the best precaution against serious damage to the equipment and consequent heavy maintenance expense. Proper lubrication was held to be an important factor in avoiding high maintenance and serious interruptions to service.

Mr. Skelley reported that the opera-

tion of buses by the Tri-City Railway to date was costing 15.2 cents per bus-mile. The buses are used as feeders only and the service is very light. Income averages about 12 cents per mile, making a net loss on the bus operations of about 3.2 cents per mile. Pull-ins due to failures are about one per 3,000 miles of operation and are all due to minor defects such as fan belts, punctures, etc.

A. E. Johnson, supervisor of bus operation Waterloo, Cedar Falls & Northern Railway, said that the bus is a legitimate means of transportation, primarily because it is popular with the public. He felt, however, that the use of reduced fares in the battle for business is all wrong, and sets a dangerous precedent which is very liable to make it extremely difficult to adjust fares to a profitable point when the use of the new vehicles becomes stabilized. First-class equipment, careful supervision, courteous drivers and the maintenance of safe operating conditions and reliable service were held to be the proper weapons for a railway bus operator to use in a fight for business with competing lines. As an example of the safety of properly supervised bus operation, he cited the experience of his company, which has hauled more than a million passengers without an accident to a passenger except where one was hurt in a slight scuffle when the bus was standing still at the curb. Careful selection of drivers and comfortable and attractive equipment were held to be of paramount importance in fullfilling the modern conception of good transportation service. In special party service he said that his company made a flat charge of 50 cents per running mile.

Some sidelights on the bus operating insurance situation in Iowa were given by M. A. Welsh, superintendent and traffic manager Waterloo, Cedar Falls & Northern Railway. Mr. Welsh explained the provisions of the motor carrier law of the state which required every operator of motor buses to carry insurance in a company approved by the commission. Under the mandatory provisions of this law, the cost of insurance for liability only would amount to about $707 per year per bus, according to Mr. Welsh. He said that his company finally succeeded in getting relief from this heavy burden by convincing the commission that the prior lien provisions of the Iowa laws which give an injured passenger a prior lien on all the property of the company was protected by the large fixed investment of the railway within the state. To satisfy mandatory provisions of the motor vehicle law relative to the filing of a bond by a motor bus operator, a nominal bond was finally accepted by the commission, thus materially reducing the cost.

A paper by W. M. B. Brady of the General Electric Company dealt with the many applications for electric arc welding in salvaging electric railway materials. Mr. Brady listed a large number of items which could be profitably salvaged by welding, and gave comparative figures to show the savings which had been made in several instances from reclaiming worn parts. He described some of the applications for automatic welding apparatus manufactured by his company, with particular emphasis on the economies which could be made by welding rolled steel wheel flanges by this method. He said that preheating and annealing of welded wheels was not successful, and in addition was very expensive. This is unnecessary in welding flanges with automatic equipment, according to Mr. Brady. He attributed the lack of trouble from cracking, when the automatic welder is used for building up flanges, to the uniformity of the work as compared with hand welding, which has not proved successful in some instances. He opposed attempting to weld worn treads, as he said this produces severe and injurious strains in the material due to the extremely high temperature resulting from laying on such a large amount of material.

Mr. Lamb said that hand welding of 36-in. wheels on his property had given no trouble. J. G. Munson, master mechanic Cedar Rapids & Iowa City Railway, reported that his company has been building flanges on interurban equipment with hand welding equipment for 7 or 8 years and has experienced no difficulty. The use of welding for building up flat spots in wheels was also reported on favorably by several of those present. Welding of worn axles and armature shafts was not recommended, as it was felt by some that these parts should be scrapped when they have become so worn as to require building up the journals. Mr. Feist described the practice on his property of using a pit grinder to keep the tread diameters of mating wheels the same, and attributed freedom from sharp flanges to this practice. Mr. Munson concurred in the conclusion that the practice of keeping wheels ground to the same diameter gave freedom from sharp flanges and cited an example from his experience of wearing out rolled steel wheels completely on single-truck safety cars without turning, by putting on wheel-truing brake shoes whenever the wheel diameters became slightly different.

Mr. Skelley read a paper prepared by T. E. Wood, master mechanic Omaha & Council Bluffs Street Railway, on the maintenance of equipment. In this paper Mr. Wood pointed out the need for reduced maintenance cost to meet the materially decreased revenue of many electric railways, and held that increased efficiency of maintenance men, the adoption of the most improved methods of doing work and general raising of employee morale through good management by the head of the department were the methods by which this result can be accomplished. Mr. Wood said that the car inspector plays one of the most important parts in the maintenance of equipment and emphasized the importance of selecting and training these men with extreme care. A blueprint form used by the Omaha company for sending a comparative statement of equipment failures to the various carhouse foremen helps materially in getting more careful inspection by inspiring a spirit of rivalry among the various foremen. He said that systematic inspection is the first step in getting good inspection and reported that all of his company's cars are equipped with Economy meters, whi help materially in assuring inspecti at proper intervals.

Another method of helping the va ous foremen to do good work, accordi to Mr. Wood, is to furnish them wi copies of blueprints showing car wiri diagrams, part numbers of car equi ment for ordering purposes and a other information which will help the in making repairs or replacements parts. Keeping a complete file foreign prints which is always ava able to shop foremen and from whi information can readily be furnished carhouse foremen was also considered help in getting good results in Omah Mr. Wood said that dipping and baki of armatures had been a distinct su cess in reducing armature maintenan He also described the Omaha company method for cutting the cost of painti by minimizing on labor and material.

Mr. Feist called attention to t trolley wheel as a source not only maintenance cost, but also of pow loss. Mr. Anderson said that his ro had obtained average mileages of b tween 20,000 and 22,000 miles fro wheels of the type designed by M Feist. With this type of wheel, Mr. A derson also said that it had been ab to do away with one night inspector each of its stations. In answer to question Mr. Wood said that it was t practice on his property to have t Economy meters read by the transpo tation department. Mr. Sutherla said that the savings during the fir year after the installation of Econom meters in Davenport amounted $12,000. In answer to a question also said that the average number pull-ins for all mechanical causes the cars of the Tri-City Railway, i cluding fenders and broken glass, w 6,400 miles per pull-in.

John S. Dean, Westinghouse Electr & Manufacturing Company, read paper prepared by C. Bethel of t railway motor engineering departme of his company on the subject of lubr cation of railway motors. In th article Mr. Bethel not only outlin some of the high spots in correct lubr cation practice, but also gave char and curves illustrating in detail son of the reasons for these conclusions shown by careful tests conducted his company. A complete article Mr. Bethel on this subject was publish in ELECTRIC RAILWAY JOURNAL, issue April 19.

The paper was received with intere by the Iowa men, and many sidelig on lubrication practice were brought o in the discussion. Mr. Feist said th he believed in the use of plenty of o and although this material should n be wasted, he felt that the loss of o armature through insufficient lubric tion would more than offset all the sa ings made through restricted use of o The most important item in lubricati procedure, according to Mr. Feist, to make sure that the man in charge the work does not miss a bearin through carelessness when going over car. Mr. Welsh of the Viscosity O Company said that if every operat followed closely the suggestions co tained in Mr. Bethel's paper the would be very few lubrication failur on electric railway equipment. M

Feist attributed most equipment troubles to the vibration caused by poorly lubricated and worn parts. Mr. Dean described various methods used by railways for making bearings fit tight in the motor housing after they have become worn. One method described was that of driving a drift through the shell to expand the outside diameter, and the other consisted of copper plating the outside of the worn shell until the desired diameter had been obtained. In this latter method the bearing is first babbitted and then copper plated, after which the babbitt is bored out to the correct diameter to fit the shaft. He said that the cost of the process averaged about 30 cents per bearing. Mr. Dean also described a new type of oil seal housing which is being perfected by his company, but is not yet on the market.

At the conclusion of the meeting, a nominating committee consisting of C. M. Feist, John Lewin and W. G. Lamb brought in a recommendation for the membership of next year's convention committee, which was unanimously approved. The members elected to this committee are as follows: W. L. Wilson, engineer maintenance of way Des Moines City Railway, chairman; R. H. Findley, Omaha; R. C. McMahon, Des Moines; W. G. Lamb, Waterloo; W. A. Clough, General Electric Company; F. R. Grant, Westinghouse Electric & Manufacturing Company, and H. R. Sampson, Ohio Brass Company. John Sutherland, master mechanic Tri-City Railway, was re-elected chairman of the meeting for next year.

## Maintaining Street Railway Track*

By M. W. Freund
Superintendent of Way and Structures
Tri-City Railway, Davenport, Iowa

IN ANY track repair job the procedure depends on the condition of the rail, joints, ties and the foundation under the ties. One stretch of track in Davenport approximately 1,800 ft. long on a 4 per cent grade was 18 years old. This was built of 7-in. tram rail, ties 2½ ft. center to center, and was in very bad condition. The rail in this track was worn down to such an extent that there were two, and in some places three, grooves in the tram. These grooves were so deep that the wheel flanges could not slide sidewise from one groove to the other, and as a result cars were being derailed at the rate of one per day. Relief at minimum cost was obtained by renewing one rail of the track with a tram rail which had sufficient depth to permit the flanges of the wheels on one side of the car to slide sidewise on the head of the rail. This track has been operated more than 3 years without a derailment.

We have renewed the rail on several other stretches of track at comparatively small expense. These stretches were built new in 1903 with 7-in. tram rail, ties 2½ ft. centers, ballast under the ties. In 1912, on account of street paving by the city, it was necessary to reconstruct these stretches of track. The old rail and joints were used, but 50 per cent of the ties were replaced. The ballast was removed and 6 in. of concrete placed under and between the ties. By 1924 the rail and joints had become very poor in condition. The brick paving concrete foundation and the ties were still good. In this case, 10 in. of paving on each side of the rail was taken up, and the rail was carefully shimmed with steel and wood shims and was then spiked to the old ties.

Rail joint repair practice varies with the conditions encountered. When the joints are tight, whether welded or bolted, and there is a very slight cup, it is our practice to grind the joint to a perfect surface with a reciprocating grinder. When the joints are tight and the cups are deep, the rails are built up with an arc welder using hard steel, and are then ground with a rotary grinder. If the joint plates become loose but are still in good condition, they are rebolted, and usually are welded to the rails. When the joint is loose and plates are also badly worn, new plates are welded to the rails provided both rail ends are in good condition. In the case of joints on Lorain section 80-316 rail—we have experimented with welding the old continuous joints after the base support has been cut off, making them fish plates. These plates are set in close to the web of the rail at the base. The top of the outside plate is set ⅛ in. out from the head of the rail. The joint is then bolted with six bolts and welded to the base, the outside plate being welded only at the top. As it is very difficult to weld the inside plate at the top, the welding is omitted. When the joints are loose and the rail ends are broken, it is necessary to cut out the broken rails and insert a piece of rail with two new joints. The length of the rail cut in depends on the tie spacing, varying from 4 ft. to 14 ft., the latter being used when ties are on 6-ft. centers. The new joints are always placed over ties.

New joints that are being put in are ⅜-in. machine plates with four-hole drilling. These are welded to the rail at the head and base by either the carbon or metallic arc. There are three welds made on tram rail, and four on tee rail. Rails are cut through the head with a hack saw and the remaining part of the cut is made with an oxyacetylene torch.

When repairs are necessary to manganese centers in special work, they are built up with a special manganese welding rod, which gives satisfactory results providing the welding is done according to instructions. Loose hard centers are not welded until after they are tightened. This is done by removing bolts and raising the center on shims to the proper elevation and then replacing bolts and tightening. After the center has been reset and the cars have operated over it for a few days, it is again tightened and the bolt holes filled with hot asphalt.

New track in Davenport is constructed with 8-in. stone ballast, creosoted oak ties spaced 2 ft. center to center, 7-in. 80-lb. tee rail, 25-in. four-hole machine joints and tie rods spaced 10 ft. The joints are opposite and are welded by the carbon-arc process to the head and base of the rail, mild steel insert being placed between the rail ends before welding. All new track is ground with a reciprocating grinder.

In the reconstruction of old track the best of the old bricks are saved. The rails are then jacked up from the ties and removed, the ties remaining to be removed by the steam shovel. After the grading is completed, the sub-grade is rolled, and 6 in. of stone distributed and rolled. The ties are spaced on 2-ft. centers, the rail distributed and spiked, after which sufficient stone is placed in the track to raise to grade and tamped with Ingersoll-Rand pneumatic tie tampers. After tamping, the cars are permitted to operate over the track in order to hammer it down thoroughly. It is then raised to grade and retamped, the interval between tampings depending upon the frequency of the car service, the average time being four days. After the second tamping the track is lined and is then ready for the concrete paving base, which is placed during car operation. Brick paving is laid on a 1-in. cement mortar cushion mixed 1:4, and is filled with 1:2 grout. Vehicular traffic is not permitted on the paving for at least 4 days.

Where the old track is in solid concrete other methods are employed to do the excavating. Air hammers are equipped with chisel points and are used to loosen the ties from the concrete and cut a channel along the edge of the excavation. Where the concrete is 10 to 12 in. thick it is necessary to use steel tipped wooden prys 4 in. x 6 in. x 12 ft. long to raise the concrete, which is then broken with heavy sledges. This concrete is crushed by a portable crusher and used as ballast in the new track.

During the winter of 1923 and 1924 the Tri-City Railway made a number of track changes in Davenport on account of the rerouting of the cars. The work was done in the most severe weather, the temperature on many days being below zero. In making the excavations, it was necessary on a few jobs to remove 21 in. of frost. After this was completed, the building of the track, including tamping, was done with very little difficulty. Concrete was placed on days when the temperature was higher than 20 deg. F. We did not have much success heating the materials for concrete before putting them in the mixer, as the amount of material needed for concrete for one day was considerably larger than could be heated. We used a mixer that could deliver 6 cu.yd. of concrete per hour, and heated the materials after they were placed in the mixing drum with a Hauck concrete heater. After being placed, the concrete was covered with straw on the top of the rail, and the straw in turn was covered with a cheap grade of tar paper to prevent the wind from blowing it away and also to help retain the heat in the concrete. When the weather was not too cold, the straw and tar paper were removed after 48 hours. The concrete was then swept clean and heated with large paving heaters and paving lard. The sand for the paving cushion was heated on old junk boilers. Steam from a portable

*Abstract of a paper presented before midyear meeting of the Iowa Electric Railway Association, Des Moines, Iowa, Nov 13, 14, 1924.

boiler was used to heat the water that was used for making the mortar paving cushion and the cement grout. Immediately after grouting, the paving was covered with the straw and tar paper, and was thus protected for at least a week when the weather was moderate, and longer when it was very cold.

## Experience with Automatic Substations*

By D. H. Nail
Superintendent of Power Des Moines City Railway, Des Moines, Iowa

AUTOMATIC substations do not require a great deal of attention other than periodic cleaning and inspection. In the early use of these stations in Des Moines they were inspected twice each month. Later on we found that this time could be extended to once each month without any trouble occurring to the equipment. The buildings in which these equipments were installed are fireproof and well ventilated. When inspections are to be made the station is shut down after the morning peak load is over, the machine is blown out and the switchboard and the station are cleaned up. Compressed air is furnished by a portable air compressor operated by a 600-volt d.c. motor. This compressor is transported in a truck to each station when inspections are made.

After the station has been blown out the maintenance men inspect each part of the apparatus separately, clean the machine, interlocks and relay contacts, and go over all nuts and terminals on the back of the switchboard to see that everything is clean and making good contact. All protective devices are next tried out to be sure that they are working properly. This is done by starting up the machine but not letting it go on the line. The inspector then operates each protective relay or electric interlock by hand in the same manner as they would operate normally.

After all these protective devices have been thus tested out, all line and control switches are closed so that the machine may come on the line normally. The time required for two men to clean and inspect a one-unit station is about 6 hours. This allows plenty of time for the station to be back on the line in time for the evening peak load.

The Des Moines City Railway was among the first to install automatic controlled substations exclusively for city railway power, having begun in the year 1916 and continued with this work until the entire system is now fed from this source. At the same time the Des Moines & Central Iowa Railroad began to use automatic controlled substations for interurban service. Up to the present time the Des Moines City Railway has 10 and the Des Moines & Central Iowa Railroad has 5 substations operated by automatic control. These rotary converters range from 300 to 750 kw. each. The Des Moines City Railway was also among the first to build a portable substation automatically controlled. This station is of 500-kw. capacity and the equipment is installed in a steel car. The power transformer is designed for 4,500 or 22,500 volts as the city transmission lines operate at 4,500 volts, while the transmission lines feeding the substations for the Des Moines & Central Iowa interurban system use 22,500 volts. Two sets of operating and instrument transformers are needed for the different voltages. The time required to change the station from 4,500-volt to 22,500-volt operation is about 4 hours. This arrangement makes this portable substation very handy in case of trouble with either a city or an interurban station.

Data on the efficiency of automatic substations, and a comparison of the relative economy of automatic and hand-controlled stations, are furnished by the following figures for one year:

OUTPUT AND CONVERSION LOSS OF AUTOMATIC SUBSTATIONS, DES MOINES, IOWA

| Location | Substation Capacity Kw | Annual D.C. Output Kw.-Hr. | Conversion Loss Per Cent |
|---|---|---|---|
| City Lines | | | |
| 12th and High Streets | 500 | 1,884,700 | 10 77 |
| E. 2nd and Walnut Streets | 500 | 2,435,150 | 8 66 |
| Interurban Lines | | | |
| Brenton | 300 | 197,080 | 22 01 |
| Hyperion | 300 | 240,320 | 23 45 |
| Interurban Lines, Hand-Operated | | | |
| Mitchellville | 300 | 235,420 | 37 45 |

The last two stations both having the same kilowatt capacity showed a difference in d.c. output of 4,900 kw.-hr., but a difference in conversion loss of 14 per cent for the period of one year. Aside from the saving due to the low conversion loss there was the additional important saving resulting from the elimination of operators in the automatic stations.

Comparison of the costs of operating the same single unit 750-kw. station automatically and by hand for a period of a year as taken from our operating data shows the following results:

| | Hand Operation | Automatic Operation |
|---|---|---|
| Conversion loss, per cent | 22 | 12 |
| Conversion loss, kilowatt-hour | 475,000 | 259,000 |
| Loss at $0 0125 per kilowatt-hour | $5,712 50 | $3,237 50 |
| Maintenance labor, materials and supplies | 450 15 | 450 15* |
| Wages of three operators working 8 hours per day at 50 cents per hour | 4,380 00 | |
| Total operating cost per year | $10,542 65 | $3,687 65 |
| Saving from automatic operation | | $6,855 00 |

* Taken at actual cost of hand station

Conversion losses in per cent for two-unit automatic substations, taken from actual records for a period of 6 months, were as follows:

| | Machine No. 1 | Machine No. 2 |
|---|---|---|
| Station at 12th and High Streets, loss, per cent | 5.47 | 7.15 |
| Station at 2nd and Walnut Streets, loss, per cent | 8.81 | 5.06 |

Under conditions where the leading machine is carrying light load part of the time, and the trailing machine comes on the line during the peak only, when it is not subject to light load conditions, the leading machine naturally shows the highest proportions conversion loss. This condition does not exist when the two machines are more uniformly loaded.

Comparison of inspection and cleaning costs for nine automatic substations of 500-kw. capacity each operated by the Des Moines City Railway shows the following results for one year:

| | Total Cost per 9 Stations | Average Cost per Station |
|---|---|---|
| Inspection and cleaning labor | $1,623 56 | $180 [illegible] |
| Maintenance labor | 2,238 76 | 248 [illegible] |
| Supplies, including brushes for machines, rags, oil, waste, aluminum arrester electrolyte, sweeping compound, floor brushes, etc. | 885 62 | 98 [illegible] |
| Maintenance materials and parts | 927 05 | 103 [illegible] |
| Totals | $5,675 19 | $630 [illegible] |

The use of automatic substations in Des Moines has not only proved economical from the standpoint of operation and maintenance costs, but, due to the fact that an operating force is not required, has permitted the use of more stations giving more feed-in points on the system. This increased number of feed-in points has reduced the amount of d.c. feeder necessary and has resulted in providing a very uniform trolley potential throughout the system, permitting higher schedule speeds and lower power losses.

For interurban service automatic substations can be located along the line where it would not be convenient to use the hand-operated substation as some companies find it necessary to locate hand-operated stations near points where they can furnish living quarters for the attendants.

## Subways in the Air

TAKING as his subject "Traffic and Transit," Mayor Hylan of New York City addressed a joint meeting of the American Society of Civil Engineers and the American Society of Mechanical Engineers on Nov. 19. He told how under his administration the city had spent huge sums of money for the purchase of street cleaning equipment and praised the efficiency of the New York Fire Department. Incidentally, he repeated his well-known ideas on the benefits that would result to the city from the removal of "worn out" street railway tracks, "antiquated" elevated structures and the inauguration in their stead of a swiftly moving "modern bus system."

He spoke in glowing terms of the benefits which resulted from the removal of the elevated spur on upper Sixth Avenue and prophesied the early removal of the rest of the elevated railway in that street. To care for the present traffic he wants the much-discussed Sixth Avenue subway to be built by the city. The Board of Transportation is now working on plans to accomplish this. No intimation was given, however, as to how it is proposed to construct a new subway at Thirty-fourth Street, where three underground lines at different levels are already in existence, nor where the money is to come from to carry out the city's ambitious projects.

Following the talk by Mayor Hylan

*Abstract of a paper presented before midyear meeting of Iowa Electric Railway Association, Des Moines, Nov. 13, 14, 1924.

Fire Chief John Kenlon told how the construction of elevated railways in various parts of the city had destroyed property values. He expressed the opinion that no more such structures should be built. The difficulty of moving fire apparatus through the congested streets was also mentioned by this speaker.

Major Elihu Church, transportation engineer Port of New York Authority, in a snappy talk told of the growing popularity of horse-drawn vehicles for heavy trucking in New York City. He cited actual counts showing more than 70 per cent of the vehicles carrying freight to and from certain terminals being drawn by horses. The proportion is steadily increasing, he said. Time, not distance, being the measure of expense in heavy trucking, the superiority of the cheaper vehicle is notable where congestion exists. With the average speed of traffic movement in the city streets being from 3 to 4 m.p.h. and with one-half to two-thirds of the time of the truck spent standing still, it is more economical to use horses. Major Church explained how a system of trunk line motor highways and by-passes around cities would relieve this severe congestion.

# Utilities Commissioners Discuss Bus Regulation

THE annual meeting of the National Association of Railroad & Public Utilities Commissioners was held at Phoenix, Ariz., Nov. 11-15. Most of the time of the meeting was given over to discussion of matters not especially pertinent to electric railways. The new president elected was William D. B. Ainey, chairman of the Public Utilities Commission of the Commonwealth of Pennsylvania, who is well known in electric railway circles, as he has several times addressed the American Electric Railway Association. James B. Walker of New York was elected secretary.

J. N. Shannahan, president of the A.E.R.A., addressed the commissioners, primarily on the subject of proper regulation of the motor bus and motor truck. Mr. Shannahan's address was published in this paper last week. It was enthusiastically received at the convention. One of the members stated that Mr. Shannahan had given some very helpful suggestions on one of the most pressing problems of the day. He also suggested that the commissioners' association should give more attention to this subject, that not enough study and discussion had been given the report of the committee on motor vehicle transportation presented last year, and urged that the commissioners devote more attention to this important subject during the ensuing year.

Among resolutions passed by the convention on the subject of national legislative matters was one of interest to the electric railways. This was "that Congress be respectfully urged to make such amendments to the existing (transportation) law as shall clearly exclude from the jurisdiction of the Interstate Commerce Commission the regulation of rates and service of electric railways carrying on local street railway transportation."

A report of particular interest to electric railway men was that of the committee on motor vehicle transportation, an abstract of which follows:

### Report of Committee on Motor Vehicle Transportation

The fees thus far required in the various states from auto transportation companies may be roughly divided into three classes: (1), fees applied toward the expense of regulation; (2), fees of the nature of compensation for the use of public highways; (3), fees exacted in exchange for franchise rights.

*Fees to Cover Regulatory Expense.*—The committee believes that the exaction of fees to cover the expense of regulation is sound in principle. The regulation of motor vehicle transportation is more expensive in proportion to its volume than is the regulation of other kinds of transportation, and the benefits from efficient regulation accrue more directly to the persons engaged in such enterprises. The auto transportation companies, as a rule, do not object to the payment of reasonable fees when they feel that they are getting value received in the form of fair and efficient regulation.

*Fees or Taxes to Cover Road Construction and Maintenance.*—Motor vehicle transportation is in a class by itself in respect to the roadbed or way over which its vehicles operate. Steam and electric railroads are required to purchase rights-of-way, construct roadbeds, lay ties and steel, and maintain such structures at their own expense, and in addition thereto, pay taxes thereon.

Motor vehicles operate over highways constructed by the public, and as long as no compensation for the use of such highways is exacted of auto transportation companies, they are indirectly subsidized at the expense of the public. It would be manifestly unjust, however, to exact fees from auto transportation companies subject to regulation, without at the same time exacting similar fees from all vehicles making commercial use of the highways. Most of the states which have statutes regulating auto transportation apply them only to stages and trucks operating between fixed termini and over regular routes. By amending statutes covering the regulation of auto transportation companies operating between fixed termini and over a regular route so as to create and regulate a new class of auto transportation companies embracing practically all other vehicles using the highways for commercial purposes, they could be brought under some form of regulation and could be required to make reports upon which equitable fees could be based. As a general rule trucks used by private industries in the transportation of their own products, which are not operating for hire in a strict sense, are more heavily loaded and do more damage to the highways than those of any other class. Yet they are in a position most likely to escape fees or taxes exacted as compensation for the use of the highways, except the gasoline tax.

*Gasoline Tax.*—A large number of states are now exacting a gasoline tax, amounting to either 1 or 2 cents per gallon in most instances. This form of tax operates equitably upon all users of the highways in proportion to the use they make of the same. It is the only tax yet devised which is fair and equitable to all. Objection to the gasoline tax on the ground that it falls equally upon those who use the highways for pleasure and those who use them for profit, is answered by the suggestion that those who use the highways for pleasure should be willing to contribute their just quota toward building and maintaining the highways. Pleasure cars are usually lighter and the mileage less than with commercial vehicles, so the amount paid by their owners is much less. It is estimated that, in the state of Washington, for instance, the amount contributed by stages in license money and gasoline tax will average about 60 per cent per mile of travel more than that contributed by private cars. In any fee system involving vehicles using the highways, the gasoline tax should be a part of the system, and additional taxes might reasonably be imposed from those making commercial use of the highways.

*Other Forms of Taxation.*—Other forms of taxation designed to compensate for the use of highways and for the protection which the certificate of public convenience and necessity affords includes the gross operating revenue tax and wheelage or mileage tax. The states of Washington, California and South Dakota require, in addition to the fees imposed upon all other motor vehicles, a gross revenue or gross earning tax. In Washington, under the present law, this fee cannot exceed 1 per cent, and is designed for the sole purpose of covering the cost of supervision and regulation. In California, the amount imposed is 4 per cent of the gross receipts, less the amount paid as municipal fees and taxes. In South Dakota, the tax is 2 per cent of the gross, in addition to motor vehicle tax and personal property tax. In the state of Washington, this tax amounts to approximately $50,000 per year. In South Dakota, the tax is represented as yielding about $4,000 the first year, with prospect of considerable increase in later years. In California, the 4 per cent gross revenue tax yielded for the first quarter about $100,000. It is expected to produce at least $125,000 per quarter or $500,000 per year.

*Flat Fees.*—Alabama, Arkansas, Colorado, Connecticut, Florida, Georgia, Illinois, Indiana, Michigan, Minnesota, New Jersey, New York, North Dakota, Ohio, Oregon, Pennsylvania, Tennessee, Texas, Wisconsin, and the District of Columbia have widely varying flat fees, based in most instances on the passenger seating capacity as applied to passenger cars and on weight or

capacity as applied to freight carrying trucks. This form of taxation is so new that the committee was unable to secure information regarding experience with this form of tax or its desirability.

*Wheelage Tax.*—Other states, including Iowa, Maryland, Oklahoma, Virginia and West Virginia, impose certain taxes based upon ton-mileage. There is a wide variation, both in the method of computing the tax and in the amount of the tax imposed. In Iowa, the tax for motor vehicles having pneumatic tires is ½-cent per ton-mile of travel over and along the public highways. For motor vehicles having hard rubber or solid tires, the tax is ½ cent per ton-mile. The statute also includes the method of figuring the ton-miles of passenger travel, the passenger weight being taken at the full seating capacity figured at 150 lb. per passenger, plus the weight of the vehicle, multiplied by the number of miles operated, which, however, cannot be considered as less than the number of miles required to maintain the schedules filed. When figuring ton-miles of freight travel, the freight carrying capacity of each truck or unit, including trailers, plus the weight of the vehicle, is used in calculating the ton-miles. The Iowa law applies to persons or corporations operating a motor vehicle for delivering merchandise other than farm products, except those operating wholly inside of city limits, as well as passenger and freight carriers operating for compensation over their regular routes or between fixed termini. The amount of revenue from this tax for the year ending July 4, 1924, was estimated at $50,000.

In West Virginia, passenger carriers operating over regular routes, where the vehicle weighs less than 3,000 lb., are required to pay 1/20 cent for each passenger seat-mile; over 3,000 lb. and less than 7,000 lb., 1/15 cent per passenger seat-mile; and over 7,000 lb., ⅛ cent per passenger seat-mile. Property carriers over regular routes pay for a capacity of 3 tons or less ⅛ cent per ton-mile; over 3 tons and less than 5 tons, ¼ cent per ton-mile. Passenger carriers not running over regular routes or between fixed termini pay a flat rate of $75 yearly. Property carriers under the same condition pay a fee double that of trucks not used for hire. The above law became effective on July 27, 1923, and the revenues collected thereunder up to June 30, 1924, were approximately $306,000. A feature of the law is that vehicles operating over a regular route are required to pay the full year's tax in advance.

### No Special Taxation Imposed in Some States

Some states, such as Michigan, Nevada, New Hampshire and Vermont, impose no state tax other than the ordinary fees required of all motor vehicles, but the various counties and other local subdivisions are permitted to impose certain fees in widely varying methods and amounts. The committee believes that such a system is wrong in principle and is illogical and inequitable. All fees should be uniform throughout the state and should be collected by state agencies, with the possible exception of a municipal fee for vehicles operating wholly within city limits.

Arizona, Delaware, Kansas, Kentucky, Mississippi, Missouri, Nebraska, South Carolina, Utah and Wyoming impose no taxes or charges upon auto transportation companies or vehicles other than those applicable to all other motor vehicles, unless such legislation has been very recently enacted.

In the discussion by correspondence between the various members of the committee, it was suggested that the mileage tax or other fees exacted should be based somewhat upon the character of roads over which the operation is conducted. After considerable discussion, it was agreed that it was impracticable to base a tax upon the type of road traversed.

George H. Pride, president of the Heavy Haulage Company of New York City, speaking on the subject of cost accounting in highway transportation operation not long ago, made this statement:

### The Public Pays the Cost of Motor Transportation

"The public as a whole pays for the construction and maintenance of the highways in the form of taxes, and, although it is not generally realized, it also defrays the entire cost of the motor truck transportation which passes over the highways in the price for the commodities it buys, for it can be unqualifiedly stated that practically everything purchased has been transported by motor truck one or more times during its process of fabrication."

Mr. Pride also states that eleven times as much money is spent in operating motor trucks over the highways yearly as is spent in building the highways themselves.

In imposing taxes upon motor vehicle operation in any state, careful consideration should be given to existing statutes, so as to avoid pyramiding taxes to the injury of motor transportation and ultimately to the inconvenience of the public. In the state of Washington, for instance, the stage is subject to regulation by paying $56,522 a year license money and about $35,000 per year gasoline tax, or $91,522 per year for the use of the highways. The trucks, subject to regulation, pay about $25,000 per year license money and about $15,000 per year gas tax, or about $40,000 per year for the use of the highways. The same stages pay about $65,000 per year and the trucks $25,000 per year personal property tax. Thus it is seen that the stage is at present operating under regulation by paying to the state under the various statutes about $220,000 annually besides the gross operating revenue tax of 1 per cent, designed to cover the expenses of regulation, which amount to approximately $50,000 per year. The total for the state of Washington, $270,000 per year, is equivalent to about 5.4 per cent of the gross operating revenue of auto transportation companies. No doubt similar situations exist in other states.

In California, the license fee is a flat sum of $3 per year against an average license fee in Washington for stages of $91.74 and an average fee for the type of trucks used by transportation companies of a $77.50. In California, all munic fees and taxes are deducted from gross revenue tax. It is doubtfu the auto transportation companie California pay a greater per cen their gross revenue under the 4 cent law than is required of such panies in the state of Washin under the various tax and license visions of that state.

### Seven General Principles Propo for Taxation

At present the time of opera under the various laws has beer short that it is impossible at this to determine, from the standpoin operation and experience, the practicable and feasible method of ing auto transportation compa The announcement of a few fu mental principles, the committee lieves, should be helpful in the en ment of any fee statute.

1. A reasonable gasoline tax sh be imposed, applicable to all veh using the highways.

2. All taxes imposed upon m vehicle common carriers should be posed and collected by the state, a possible exception of city taxes u vehicles operating wholly within city limits.

2. An equitable franchise tax m properly be imposed upon vehicles o ating between fixed termini and a regular route under certificate public convenience and necessity, to exclusion of vehicles not so operatin

4. Taxes or fees on motor veh common carriers, the proceeds of w are limited to the construction maintenance of highways, should imposed upon all stages, trucks "for hire" cars, whether operating tween fixed termini and over a reg route or otherwise, or whether o ated for hire or by private indust in the transportation of their own c modities.

5. In states where the imposition fees and taxes would cripple or dest small stage or truck operations ren ing useful service in sparsely set communities, any revenue tax imp should apply only to revenues over above a reasonable return to the m vehicle carrier.

6. Statutes which provide for regulation of auto transportation c panies operating over regular ro and between fixed termini should amended so as to include motor veh common carriers not so operating; in any case fees for the use of highways, whether flat or in the f of mileage tax or revenue tax, sho apply to all motor vehicle common riers, whether subject to regulation not.

7. Any new or supplementary fee tax statute should take into conside tion all fees and taxes paid un existing laws, so that the total for one purpose or as a whole shall not unjust, unfair or unduly burdenso

The report was signed by E. V. K kendall, chairman; T. E. McKay, H Harding, Gen. J. F. O'Ryan, I Bowen, J. F. Harper, O. W. Ru H. V. Osborne and G. R. Shelby.

### Southwestern Association Convention at Houston Next May

THE executive committee of the Southwestern Public Service Association, at a recent meeting, set the 1925 convention of this association for Houston, Tex., May 19-22. W. E. Wood, Houston, heads the convention committee.

### New York State Dinner on Jan. 22

THE New York State Railway Association will hold its next convention in New York City on Jan. 22 at the Commodore Hotel. There will be a morning and an afternoon session and an informal dinner in the evening.

# American Association News

## Executive Committee

THE executive committee of the American Association met in New York on Nov. 21, with the following members present: President J. N. Shannahan, R. P. Stevens, W. H. Sawyer, L. H. Palmer, R. I. Todd, F. R. Coates, A. W. Brady, L. S. Storrs, C. E. Morgan, T. C. Cherry, C. H. Clark, W. L. Davis, M. B. Lambert, E. P. Waller, B. A. Hegeman, Jr., C. S. Hawley, A. A. Hale and Secretary Welsh.

R. P. Stevens, chairman of the finance committee, presented the annual audit of accounts, which was accepted. He also presented the budget for 1926, which anticipated receipts of $321,000 and expenditures of $318,000. This was approved. An appropriation of $2,500 in support of the street and highway safety program of Secretary of Commerce Hoover was approved.

Mr. Coates reported briefly for the policy committee. He was authorized to draw up a resolution giving the indorsement of the association to the work of the Better Business Bureau and the National Vigilance Committee, and urging co-operation of member companies with these organizations in their own cities. The committee on policy was also instructed to draw up a statement expressing more definitely the position of the association with respect to the motor bus. Similarly, the question of proper regulation of interstate highway carriers was referred to the committee on national relations.

A communication from Gen. Guy E. Tripp, chairman of the Committee of One Hundred, was read, which requested a termination of this committee's activity on Jan. 1, 1925, in view of the fact that the association is now financially able to carry on this work on the same scale. This action of the Committee of One Hundred was recorded and President Shannahan directed to write a letter on behalf of the executive committee to General Tripp, thanking the Committee of One Hundred for the splendid work it has done in the interest of the association and of the industry.

At the suggestion of President Shannahan and on motion of Mr. Sawyer, the president was authorized to appoint an advisory council of the association, whose membership will be made up of the principals representing ownership of electric railway properties. The function of the advisory council will be to carry on the work formerly done by the Committee of One Hundred and such other matters as it may consider desirable to act upon. President Shannahan expressed the thought, reiterated by Mr. Sawyer, that the American Electric Railway Association has not had the co-operation of the owners of the properties to the extent desired. It was felt highly desirable to create some arrangement which would bring to the association the benefit of their interest and active support.

Mr. Palmer reported for the committee on company and associate membership that one railway had applied for membership, this being the Bamberger Electric Railroad Company, Salt Lake City, Utah. Bonbright & Company, investment bankers, New York, had applied for associate membership. These applications and those for twelve manufacturer members were approved.

Mr. Morgan reported for the company and community section and individual membership committee. The main point of interest was that the membership of the Metropolitan Section in New York has now reached 693. Mr. Morgan spoke briefly of the great interest shown in the meetings of this section and also of the fact that many of the members had shown a new interest in industry problems as a result of attendance at the first two meetings.

Mr. Clark, president of the Engineering Association, asked for and received the approval of the executive committee, to invite certain railway companies to send engineers as members of a committee which will make a special study of the causes and cure for rail corrugation. This committee will make a tour of inspection of the conditions on a number of properties. Each company will be requested to pay the expenses of its own representative and a portion of the expense of the secretary of the committee, who will probably be a professor of some university which takes an active interest in electric railway matters. This secretary will compile the report. Mr. Storrs for the Connecticut Company, Mr. Morgan for the Brooklyn City Railroad, and Mr. Emmons for the Baltimore company, agreed to send a man on this trip and Mr. Clark was authorized to send out his letters inviting other companies to do likewise.

In the absence of J. P. Barnes, Secretary Welsh read the report of the committee on public relations. This will appear in next week's issue of this paper.

Mr. Sawyer reported the recommendation of the committee on location that the Midyear Meeting be held at Washington on Tuesday, Feb. 17. This was approved.

President Shannahan spoke on the fact that the lease on the headquarters office expires shortly and that the association will have to face a considerable increase in rent as the present lease was made 10 years ago. On motion he was authorized to appoint a committee consisting of the chairman of the finance committee, Mr. Stevens, the chairman of the policy committee, Mr. Coates, himself, and such other members as he may direct, to consider this matter and with power to act.

On motion the president was authorized to appoint a committee on customer ownership, the suggestion having been made in a letter from Past-President Britton I. Budd.

Mr. Coates read a report on the American committee on inductive coordination and requested an appropriation of $250 to support the work of this committee. This was approved.

A letter from C. L. Van Auken, vice-president and managing editor *Electric Traction*, was read requesting President Shannahan to make a place on the program at next year's convention for the award of a certificate of merit and a silver cup to the company showing the highest operating speed and asking him to make the award. The president was instructed to thank *Electric Traction* for the spirit and motive behind the suggestion but to disapprove it.

As a matter of information, Secretary Welsh pointed out that the National Industrial Conference Board is now engaged in making a study of the weekly earnings of public utility employees. One of the executives stated that executives in other industries are beginning to ask why street railway wages are going up while all others are going down. This trend is putting the electric railways in an unfavorable light among other industries.

The next meeting will be held in New York on Wednesday, Jan. 7.

## Location of Midyear Meeting

"AT WASHINGTON, Tuesday, Feb. 17" were the place and date selected by the committee on location at its meeting in New York, on Nov. 20, for the Midyear Meeting and dinner of the American Electric Railway Association. Members of the committee present were Chairman W. H. Sawyer, President Shannahan, Charles Castle, A. A. Hale, S. J. Cotsworth, J. H. Hanna, E. P. Waller, E. C. Faber, Harry L. Brown and Secretary J. W. Welsh.

The committee also discussed the question of the location of the annual convention next fall and whether or not there should be exhibits. Mr. Brown reviewed to the committee the wishes expressed by some 40 manufacturers in various parts of the country. The expression of these manufacturers was almost unanimous in favor of having exhibits with the convention.

Young's Pier in Atlantic City is becoming increasingly inadequate for the electric railway exhibition and a sub-committee was, therefore, appointed to make a thorough investigation as to a more suitable location and also to determine whether any improvement in facilities at Atlantic City may be possible. This sub-committee will report back to the main committee at the time of the Midyear Meeting in Washington.

# Maintenance of Equipment

## Overhead Rail for Handling Armatures

BY J. G. JEFFERY
Director of Public Relations Los Angeles Railway, Los Angeles, Cal.

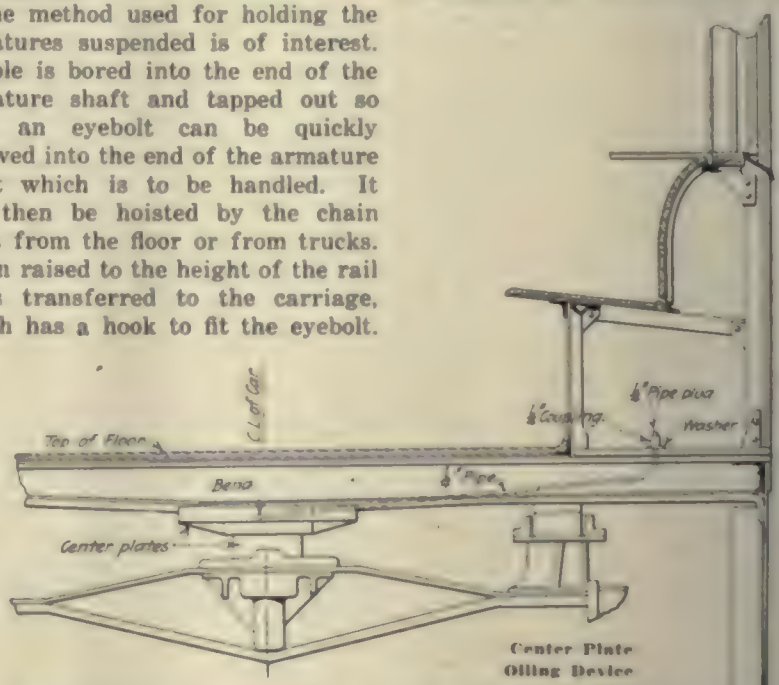
THE use of an overhead rail for moving armatures in and out of the new preheating and electric baking ovens at the shop of the Los Angeles Railway is proving a great time and labor saver as well as providing a more convenient method than the use of trucks for rolling these armatures about. The overhead rail extends for a considerable distance in front of the preheating oven. Armatures are hoisted to the overhead rail and are suspended from carriages which travel on the rail, which extends entirely through the oven. They are preheated for 12 hours at a temperature of 205 deg., after which they are pushed out the opposite end of the preheating oven, which has a semi-circular extension of the overhead rail. On this end the armatures are dipped in insulating varnish. A tray is placed underneath to catch the drippings, and the armature with the tray attached is then pushed into the baking oven, where it is kept at a temperature of 195 deg. for 48 hours.

At present the armatures are dipped by lowering them into a stationary tank, but the company is considering building a tank for the insulating varnish with provision so that it can be lifted by an air hoist. With this arrangement it will be unnecessary to remove the armatures from their hooks on the carriages for dipping.

The method used for holding the armatures suspended is of interest. A hole is bored into the end of the armature shaft and tapped out so that an eyebolt can be quickly screwed into the end of the armature shaft which is to be handled. It can then be hoisted by the chain hoist from the floor or from trucks. When raised to the height of the rail it is transferred to the carriage, which has a hook to fit the eyebolt.

## Convenient Method of Oiling Center Plates

IT IS extremely difficult to oil center plates on most types of car, and as a result the greasing or oiling at this point is frequently neglected. The Boston Elev Railway experienced difficulty getting the center plates apart. order to overcome the trouble, it installed oiling pipes as shown in accompanying illustration. T



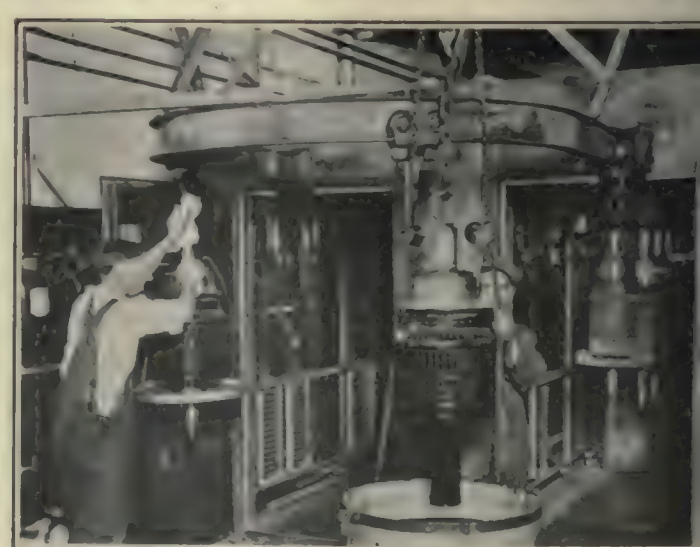

Center Plate Oiling Device

are now being used on all of Main Line rapid transit type car

The device consists of a wrought-iron pipe, bent to pr shape and leading from underne one of the longitudinal seats to center plate at that end of the



Hoisting Armatures to Overhead Rail After Eyebolts Have Been Screwed Into Armature Shaft. They Are Then Pushed Along Rail Into Preheating Oven.



At the Right an Armature Is Being Hoisted from the Dipping Tank. Armature at the Left Is Being Pushed Into the Baking Oven A Tray Has Been Placed Underneath to Catch the Drippings

The lower or center plate end of the pipe fits tightly in a hole drilled in the center plate. The end underneath the seat is fitted with a standard ¼-in. coupling and with a plug on top. When oil is placed in the pipe it works its way down to the cored chamber in the body of the center plate. From this point it passes through a small hole to the bearing surfaces of both plates. The present method consists of adding oil about once each month and the installation of these devices has entirely eliminated the trouble previously experienced.

## Making Controller Segments from Flat Stock

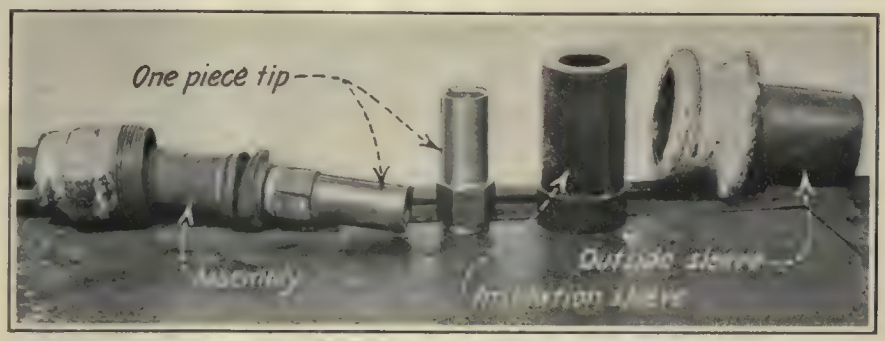
A SPECIAL machine designed and built by the mechanical department of the Twin City Rapid Transit Company enables this company to make controller cylinder segments for repair work, out of flat bar copper stock by an automatic and semi-continuous process.




Controller Segments Are Formed from Flat Bar Stock in This Special Machine Developed by the Twin City Rapid Transit Company

The flat bar copper is fed into the machine between a pair of power-driven rolls, one of which is knurled, so that it grips the stock and forces it through. A third roll at the back of the machine guides the bar, so as to form the segment of a circle. This segment can be formed to any desired radius, within certain limits, by adjustment of the position of the roll. In the illustration the curved strip of copper is shown below, after it has passed through the machine.

An automatic trip stops the machine when the end of the bar makes contact with it. By setting the trip in any desired position, the machine is stopped when a predetermined length of segment has been rolled. The horizontal saw, which is shown at the extreme right of the illustration, is then operated by the hand feed, and cuts the rolled segment off to the proper length. Another segment is then rolled and the operation repeated.




Assembly of Bus-Line Jumper Cable Includes Solid Connector Tip in Place of the Two-Piece Tip Formerly Used

## Improved Bus-Line Jumper

AN IMPROVED bus-line jumper connection has been devised at the Wheaton shops of the Chicago, Aurora & Elgin Railroad. This design eliminates the possibility of the connection burning away due to excessive arcing. The standard type of jumper used had a two-piece threaded contactor receptacle. One end was soldered to the jumper cable and the other end received the spring prong attached to the car. Although the object of this type of connector is to facilitate the changing of this latter part in case it becomes badly burned, it has led to difficulty, because a trainman in breaking the connection is apt to give the jumper a twist tending to unscrew the receptacle from the fastening on the cable end.

To eliminate the possibility of this occurring, a new design of connection was perfected. This consists of a solid brass piece taking the place of the two pieces previously used. It is fastened to the cable jumper and has sufficient brass between the jumper and the connector plug so that any heat of arcing will be dissipated sufficiently to leave the solder unharmed. The new brass plug fits into the standard insulation provided for the two-piece plug, and in every way answers the purpose of the two-piece plug with the exception of ease of renewing the end tip. It is found, however, that this one disadvantage is greatly offset by the desirability and permanency of the connection between the jumper cable and the connector tip.

## Collecting Sample Rail Sections for Forge Shop

BY J. L. ROGERS
Forge Shop Foreman Kansas City Railways

THE forge shop of the Kansas City Railways is called on to make up various parts for use in



Stored Conveniently in a Special Rack, These Sample Sections of All Rails In Use in Kansas City Enable the Forge Shop to Check Track Parts by Fitting Them to the Actual Sample Piece of Rail

trackwork. Among other things, the making of compromise plates runs into a considerable volume of work.

As the practice on the system has been revised from time to time, various forms and sizes of rail sections have been used. This has made it very important that orders for plates be carefully checked in order to make sure that they are properly made to fit the different rail sections.

Short sample lengths of rail are maintained in an appropriate rack where they are always accessible, and are not allowed to leave the forge shop. Each piece is known by its section number, and when forging work such as the making of joint plates is to be started for any particular section of rail, the workman can always check with a piece of rail of the proper section, to make sure no error has been made in the selection of the proper die before a large quantity of material is made up. In addition, any other questions regarding the correctness of forging work for the track department can always be checked by fitting to the actual rail sections in the shop.

## Rubber Cover Prolongs Life of Sand Hose

SOME time ago trouble was experienced by the Eastern Massachusetts Street Railway on account of moisture getting into the sand boxes of its cars and interfering with the proper flow to the rail. Wire hose was at that time in use for the outlets from the sand boxes. In service the wire hose had become somewhat damaged and bent, however, further interfering with the flow of sand. It was then decided to slip a piece of rubber hose over the wire hose, thus at the same time effectually closing the openings through which moisture was entering and straightening out the pipe. This arrangement is shown in an accompanying illustration. In the photograph the rubber covering has been pushed back slightly in order better to illustrate the arrangement. In reality the rubber and wire hose are of the same length. This procedure has resulted in making the flow of sand more reliable.



Wire Sand Hose Has Been Reinforced and Protected by a Rubber Hose on the Outside

## Die for Forming Sand Hose Brace

MANY operations in the forge shop lend themselves readily to the use of simple dies that effect comparatively large savings in time and labor. A device of this type is represented by the die shown in the accompanying illustration, which was developed by the mechanical department of the Twin City Rapid Transit Company for forming sand hose braces from round bar stock.

Two operations are necessary in order to form the circular loop at right angles to the supporting rod, as shown by the completed brace lying on the bench in the illustration. The first operation consists simply of making a right-angle bend in the piece. This is done by the vertical lever at the front of the die in the illustration. The condition of the piece at the end of this operation is shown by the sample.



This Simple Tool Speeds Up the Work Forming the Sand Hose Brace Shown at the Left, from ⅜-In. Round Bar Stock

After the bend is made the piece is set between two rollers, as shown in the rear of the illustration. A lever having a hook at one end is set over a pin projecting through one of the rollers, and by rotating this lever in a counter-clockwise direction, the piece of work is forced between the rollers so as to form the loop on the end. This brace is made of ⅜-in. round stock in one heat.

# New Equipment Available

## Fire-Fighting Machine Perfected

A 40-GAL. portable foam chemical engine has been developed which uses the principles of operation employed by the Foamite system of the Foamite-Childs Corporation, Utica, N. Y. The new engine has substantially the same outward appearance as the type previously used, but the internal construction has been redesigned. With this new meter-type engine, a medium pressure is generated at the start, which gradually decreases during the period of effective discharge. The volume of fire-foam generated is almost double the quantity delivered by the old type engine from the same quantities of chemical solution. In addition, the quality of the foam produced is superior to that of the old. Extensive tests have been made by the manufacturer with the new engine and it has been submitted and approved by the Underwriters' Laboratories as effective on both class A and class B fires.

## Pressed Steel Forge Hear

A ONE-PIECE hearth, 24 in. x in., constructed of heavy ga pressed metal, has been brought o by the Buffalo Forge Compa Buffalo, N. Y., for its standard li of forges. This new pressed me hearth takes the place of the ca iron construction previously us Advantages claimed for the press steel hearth are elimination of ru decreased weight and improv appearance. Breakages of the ca iron type, which occurred frequent cannot occur with the new constru tion.

# The News of the Industry

## Necessity for P. R. T. Revaluation Up to Expert

The Pennsylvania Public Service Commission, at its meeting in Harrisburg, on Nov. 17, formally requested Milo R. Maltbie, public utility expert, to determine whether a revaluation of the Philadelphia Rapid Transit Company property was necessary. The commission decided that upon his decision would rest the question of reopening the revaluation proceedings. Mr. Maltbie said he would review the testimony in the former valuation case as well as a number of other questions involved, and added that his conclusions would be ready for the commission "sooner than many expected."

Following the meeting the commissioners made it clear that the inquiry by Mr. Maltbie would in no way interfere with the hearings in the P. R. T. higher fare case. They indicated that they would be ready to go on with hearings relative to the advisability of continuing the "temporary" 8-cent fare order which they recently issued when the Superior Court hands down its decision on an appeal taken by the city.

The question of the valuation was reopened by the recent opinion of Attorney-General Woodruff, who held that a real valuation of the P. R. T. property did not exist. In that statement he quoted an opinion of the Supreme Court, which stated that "an indeterminate valuation" was not an effective or legal valuation. This opinion written recently by Attorney-General Woodruff to W. D. B. Ainey, chairman of the Pennsylvania Public Service Commission, stated that the commission might legally make an investigation which would enable it to determine whether the valuation of the Philadelphia Rapid Transit Company property was necessary and proper in connection with the pending 8-cent fare case. The opinion did not specifically direct the commission to begin the work of valuation, but it practically indicated that the work could be undertaken. The document was written in reply to three brief questions of law submitted by Commissioner Ainey on Oct. 27 and suggested by Governor Pinchot.

## Court Instructs Kansas City Railways to Submit Bus Plan

Judge Stone of the federal court at Kansas City, Mo., on Nov. 18 adjourned to Dec. 2 the final hearing as to the installation of bus service by the receivers of the Kansas City Railways. The receivers were instructed to hear all interested parties, including the civic bodies, and to prepare a report for submission on Dec. 2 embodying recommendations as to routes, type of equipment and investment required for bus service. The receivers have announced public hearings at the railway headquarters each day until Nov. 25.

Various interests, including attorneys and others representing creditors, attended the hearing on Nov. 18. They agreed to the general proposition that the installation of bus service by the receivers was necessary to protect the property from competition. These interests, however, reserved final consent until the extent of the installation and the amount of receivers' funds that would be used could be definitely ascertained. Meanwhile a decision is expected from Judge Van Valkenburgh of the federal court responsive to a petition by the receivers for an injunction against Moore and others operating a bus line in alleged violation of ordinances of Kansas City, Mo.

On Nov. 17 Judge Stone definitely instructed Prof. Harry Earl Riggs to proceed with the valuation of the property. Attorneys and others interested were heard, but no objection was raised except a general one from the attorney for personal injury claimants. He said he was opposed to any proceeding that might tend to delay a final settlement with his clients.

## Proposes Extension of Public Control

### Chairman of the Boston Trustees Urges Ten Years More Under the Present Arrangement—Other Suggestions Offered at Meeting Include "Customer Ownership" and Restoration of Five-Cent Fare, with Public Taxed for Deficit

JAMES F. JACKSON, chairman board of public trustees of the Boston Elevated Railway, proposes an extension of the time of public control of that company. He is of the opinion that the property will never be turned back to the stockholders, but that it will go from public control to public ownership.

Many other suggestions were made by various speakers before the members of the special legislative recess committee at a hearing held during the week ended Nov. 15. Some speakers suggested "customer ownership," others that the equipment should be privately owned but the structure should be owned by the public; there were suggestions that the 5-cent fare should be restored and the public taxed for the deficit, and that there should be more economy in the use of tickets.

The legislative committee is required to report on Dec. 15 what additional legislation ought to be enacted next year regarding the Boston Elevated.

A statement of the imperative needs for capital expenditures to improve the service of the railway was recently submitted to the committee by the trustees. It covered the completion of general repair shops at Everett, improved facilities at carhouses in Medford, in Arlington, in Brookline, and at Lotus place and City Point in Boston, additional boiler equipment at South Boston to make available the full capacity of that plant, underground conduits required by law, purchase of additional cars, lengthening of platforms at elevated stations, track betterments and miscellaneous additional tools and appliances, all aggregating $24,500,000. It was said at that time this program of improvement ought to be inaugurated at once and completed within ten years. It was pointed out that they mean practical economies, elimination of waste and safer and better accommodation for the riding public.

In his plea Mr. Jackson said that each item in that statement has since been re-examined for the purpose of making it conservative to the last degree. That examination led him to believe that the aggregate outlay can be reduced from $24,000,000 to $20,000,000, to be expended from time to time for purposes named by the Legislature and specifically supervised by the Department of Public Utilities. Mr. Jackson said:

> As the state policy prohibits the issue of stock at less than par value and prohibits the issue of bonds in excess of outstanding capital stock with premiums paid upon it, the trustees are facing and have faced during the past year an impassable barrier to the proper performance of their official duty.
>
> They therefore presented the situation to the Legislature, assuming that the Commonwealth in undertaking a trial of public control must have had in mind a genuine and satisfying test of the ability of public management to accomplish better results than private management is likely to secure in the conduct of this metropolitan service. They believe that no such test is possible without available capital for the purposes which have been named.
>
> The public control act informs investors that at the end of the ten contract years or at any time thereafter the Legislature may end this lease and return the railway to the lessee. It makes it plain, too, that after the ten years have expired the Legislature only can terminate public control. They may feel very sure that public control will continue indefinitely, but they realize the fact that there is always the chance that this expectation may not be realized; uncertainty prevents investment. To meet the situation the trustees have suggested the advisability of determining at this time whether or not public control under this lease between the State and the company is to continue beyond 1928. In doing this they have refrained from expression of opinion as to what the decision upon this fundamental question should be, believing it a legislative question and one upon which they should not be heard. Certain questions, however, have been asked which I desire to answer.

Mr. Jackson further said he thought the trustees agreed that if the present experiment in public control is to be

given a full test there should be legislation to extend the period of ten years named in the act with preservation of the right of the State to take over the property at any time, with appointment of trustees by the Governor for the same term of office, one member to go out of office every two years and to be ineligible for reappointment, and with generally the provisions for administration of affairs that are now found in the public control act.

He also said that the trustees agreed in the belief that this property will never be returned to stockholders; that any change from public control will be to full public ownership.

## Bus Proposal Revived for Cleveland Railway

Legislation designed to have the Cleveland Railway establish three bus lines in Cleveland, Ohio, has been introduced into the Cleveland City Council by Councilman Fielder Sanders, former city street railway commissioner.

Under this legislation the Cleveland Railway would operate three lines, one from the extreme east end of the city to the Public Square and two other feeder lines in the suburbs. The type of bus used would be that of the Fifth Avenue double-deck variety. A 10-cent cash fare would be charged with 1-cent transfer charge from the buses to the street cars, and a 4-cent transfer charge from the street cars to the buses.

It is hardly likely that the Cleveland City Council will act on the legislation until the State Supreme Court has decided the question of whether the Ohio Public Utilities Commission or the Cleveland City Council has the right to grant bus franchises and regulate bus operation in Cleveland.

A decision from the State Utilities Commission on the application of the Cleveland Railway to run buses in Cleveland under the jurisdiction of the State Commission is expected soon. If this decision takes away the right of the Cleveland City Council to regulate buses in Cleveland, the case will be appealed to the State Supreme Court.

C. M. Ballou, City Street Railway Commissioner, has recommended bus operation in Cleveland as "feeder" lines to the main arteries of the Cleveland Railway. In his report to the Council Mr. Ballou said that it is hardly necessary to restate the principle that in any community such as Cleveland all local transportation should be operated under one management.

Officials of the Cleveland Railway have expressed their willingness to undertake bus operation or extensions of the company's present system if the City Council will devise some means of financing expansion by the company. Under the present service-at-cost grant the Cleveland Railway is not permitted to sell stock except at par to obtain new capital. The company's stock is quoted in the local market at about $86 a share, a price which would make it prohibitive for the company to finance a program of extensions or expansion.

The company has asked the City Council to allow it an additional 2 cents a car-mile for operation, so as to bring the allowance for operation up to 28 cents a car-mile. If the Council does this it will increase the company's operating allowances approximately $700,000 a year.

## Municipal Subway Suggested

### Mayor Hylan of New York City Makes More Promises—Transit Commission and Mayor Still at It

The Board of Transportation of New York City, of which John H. Delaney is chairman, hopes within a few weeks to have ready for public consideration plans for Mayor Hylan's project of an independent municipally owned and operated subway system. Announcement to this effect was made on Nov. 18.

An important feature of these plans is that the trunk line of the system in Manhattan leading to Washington Heights is to be under Sixth Avenue and not under Eighth Avenue, as the Transit Commission had decided.

In undertaking to drive this new subway under Sixth Avenue, it was said, the Board of Transportation has found it necessary to effect some arrangement with the Hudson-Manhattan Railroad, whose tubes run under that thoroughfare between Ninth and Thirty-third Streets. The arrangement, it is believed, provides either for the virtual forfeiture of the franchise of the Hudson tubes uptown extension of one mile and a quarter or, as is thought to be more probable, embodies a joint traffic agreement under which some compromise may be effected looking to utilization of the level now used by the Hudson tubes by the new municipal subway also.

State Transit Commissioner Harkness says that a separate municipally owned and operated subway system, such as Mayor Hylan proposes, would mean three systems instead of two as there are today, and instead of one as there should be. He says it would also mean a triple fare instead of a double fare as there is today and a single fare as there should be. Further, Mr. Harkness said:

> Yet Mayor Hylan attempts to pose as a champion of the 5-cent fare. What the city needs to catch up for Mayor Hylan's long delay in subway construction is to build new lines as rapidly as possible and to build them so as to use every existing agency of transportation to the utmost. Expressing it in another way, the Transit Commission's plan of combination and consolidation will get in terms of added service about $1.50 for every dollar spent while Mayor Hylan's plan for a new independent system will get about 50 cents for each dollar spent.

In this connection it is interesting to note that the Transit Commission has recently made public the following chronological table of the more important moves made by it looking toward action by the city to secure adequate transit relief:

| | |
|---|---|
| Commission promulgates new subway routes | May 15, 1922 |
| Adopts Brooklyn Crosstown Route | Aug. 30, 1922 |
| Adopts first Central Park West Route | Oct. 3, 1922 |
| Adopts Staten Island Tunnel Route | Oct. 3, 1922 |
| Adopts St. Nicholas Avenue extension of first Central Park West Route | Oct. 6, 1922 |
| Board of Estimate rejects Crosstown Route | Nov. 10, 1922 |
| Board of Estimate rejects other three routes | Nov. 9, 1922 |
| Commission adopts six routes comprising proposed Eighth Avenue-Amsterdam Avenue Line | Nov. 28, 1922 |
| Board of Estimate rejects above six mentioned routes | Dec. 22, 1922 |
| Commission resubmits altered Brooklyn Crosstown and Washington Heights Routes | May 15, 1923 |
| Board of Estimate considers routes at public hearing, and joint conference committee of Commission and Board of Estimate authorized | June 2, 1923 |
| Joint conferences held | June and July, 1923 |
| Main portions of Washington Heights and Brooklyn Crosstown Lines approved by Board of Estimate at special meeting | Aug. 3, 1923 |
| Long Island City portion of Crosstown Line approved by Board of Estimate | Aug. 17, 1923 |
| Transit Commission has engineers prepare subway plans, and joint conferences continue between Board and Commission | Aug. to Dec. 31, 1923 |
| Chairman McAneny announces Board of Estimate and Commission substantially in full accord on Brooklyn Crosstown and Washington Heights Routes | Jan. 1, 1924 |
| Work on plans, specifications and forms of contracts for new subways, continued by Transit Commission | Jan. to June, 1924 |
| Board of Estimate takes definite stand rejecting all work of Transit Commission on Washington Heights and Brooklyn Crosstown Lines | June 7, 1924 |
| All construction powers transferred to Board of Transportation | July 1, 1924 |

On Nov. 14 Chairman McAneny of the Transit Commission received from the secretary of the Board of Estimate a copy of the amended draft of the Mayor's "charges" against the Transit Commission, referred to in a resolution of the board adopted Oct. 24. It will be recalled that Mr. McAneny had warned the Mayor that he would be held accountable for libelous statements. In the revised version the amiable charge of homicide, which the Mayor first made against the members of the Transit Commission, and which, until challenged, he seemed quite willing to employ as a part of his political campaigning, has disappeared, along with other libelous things. The statements that remain relate almost wholly to subjects that are matters of record. The Transit Commission will now lay before the Governor, without expurgation, the complete record of what has occurred in its three years' effort to give the people of New York City transit relief.

While all this has been going on G. M. Dahl, chairman of the board of the Brooklyn-Manhattan Transit Company, has issued under his own name a volume of 117 pages entitled "Transit Truths." Mr. Dahl has taken for his text "Truth Is Mightier Than Abuse." Mr. Dahl has spread before the public the complete record of the attitude of his company with respect to transit matters. There is a 9-page index to make reference to any particular subject easy. There are maps and plates and ads. If any doubt still remains with any member of the public in regard to where Mr. Dahl's company stands it is due to the fact that the doubter either has not got a copy of the book or cannot understand a situation such as that with which Mr. Dahl deals even when the matter has been reduced to its simplest terms.

## Electric Railway Exonerated for Chicago Grade Crossing Accident

Complete exoneration for the Chicago Surface Lines was contained in a coroner's jury report on the collision of a street car and a switch train recently in which 10 lives were lost. The case was made an issue in Chicago over the grade crossing peril and interlocking devices were studied by the jurors.

The accident occurred just after midnight of the night of Nov. 1, when the street car, heavily laden with passengers, was struck near an unlighted cut by a coal car at the end of a train of 55 cars pushed by two locomotives.

Inquiry revealed that safety gates across North Avenue were down when the street car stopped. A crippled switchman, later found to be of subnormal mentality, was on the job. When the gates went up several autos passed the car and proceeded across the track. These drivers saw nothing approaching on the railroad, and they recalled that the conductor of the street car had walked across the crossing, looked both ways and signaled the motorman to come on. Midway of the crossing and without any warning the train hit the car.

The jurors unreservedly censured officials of the Chicago, Milwaukee & St. Paul Railroad and ordered that three employees, a brakeman, the yardmaster and the assistant superintendent of terminals be held to the grand jury for manslaughter.

Former Governor Edward F. Dunne was one of the jurors and the others were Chief Justice Harry Olson of the Municipal Court, Henry Barrett Chamberlain, superintendent of the Chicago Crime Commission; County Clerk Robert M. Sweitzer, John Terborgh, vice-president of the Foreman National Bank and a capitalist, and Robert Eitel, proprietor of the Bismarck Hotel.

The verdict was rendered on Nov. 11.

## Wage Fight in Dayton

Officials and employees of the Dayton Street Railway and the People's Railway of Dayton, Ohio, are in the midst of a wage tangle the present status of which is a deadlock by both sides maintaining their original positions. One of the companies in a bulletin issued recently announced that neither the financial condition nor economic conditions in general warranted an increase in wages; that with regard to the signing of a contract it refused as it always had to operate "a closed shop" but that it was willing at all times to discuss working conditions with its employees. The bulletin was in reply to the submission by the employees of a union agreement calling for "a closed shop" and asking for an increase in wages of 20 cents an hour or 36 per cent. The present scale is 55 cents. The men also sought time and a half for overtime. The advance if granted would mean an increase in the payroll of the Dayton Street Railway of more than $30,000 a year and the People's Railway of $90,000. Reports of strike votes were made, and the company officials stated that the aid of the city would be sought in running the cars. Messrs. Keyes and Powell, officials of the Dayton Street Railway and the People's Railway respectively, announced recently that there was no change in their attitude, that the increased wages could not be granted, but that they would meet with the representatives of the men.

## Newspaper Campaign Active in Twin Cities

In addition to the card service on the cars the Twin City Rapid Transit Company is carrying on extensive advertising campaigns in the Twin Cities newspapers. The advertisements give some information on fares collected in various cities of the country and some important statistics on car riding in Minneapolis and St. Paul. Some historical facts on transportation progress in the Twin Cities are recorded. The company states that the passenger revenue has fallen off considerably and that a higher fare will be the result if service and equipment are to be maintained to the standard of the community served. In urging its patrons to ride the cars regularly the company promises a continuation of good management and co-operation.




One of the Recent Minneapolis Ads

## Boston & Maine to Run Buses

The Boston & Maine Railroad has definitely decided to go into the motor truck and passenger bus business. For that purpose it has organized the Boston & Maine Transportation Company with a capital stock of $100,000. James H. Hustis, president, has issued an explanatory statement.

There is no intention of running buses or trucks in competition with steam trains, but the company does believe there is a legitimate field for buses and trucks as an auxiliary to steam service on some of its lines and in place of steam service on other lines. A thorough study is being made of all branch lines of the Boston & Maine system. It is the opinion of the management that the results of this study will prove that on many lines buses and trucks can be used to the advantage both of the public and the railroad.

This activity on the part of the company was referred to in the ELECTRIC RAILWAY JOURNAL for Nov. 8, page 819. Included in the system of the Boston & Maine Railroad are several electric railway properties.

## Nine-Cent Fare in Poughkeepsie

The Public Service Commission on Nov. 14 authorized the Poughkeepsie & Wappingers Falls Electric Railway, Poughkeepsie, N. Y., to charge a 9-cent fare in each of its operating zones in Poughkeepsie and nearby territory until June 1, 1925. At that time the order may be reopened upon application for a review as to operating results of the company for 1924, including a six months' period under a 9-cent fare, and for whatever determination may then be deemed necessary. An 8-cent fare is now charged in all of the three operating zones. Under the application of the company decided on Nov. 14 it had asked for the right to charge a 10-cent fare. The fare increase becomes effective on one day's notice.

## New Electric Line Projected in Indiana

A new electric railroad to cost $5,000,000 is planned for southern Indiana. This electric line will provide an important traffic connection between the Chicago, Milwaukee & St. Paul and the Southern Railway. It will be primarily a freight-handling road and will tap some of the coal and oil producing sections of southern Indiana and extend across the Ohio River to Kentucky.

It is reported that the road will have terminals at Owensboro, Ky., and Elnora, Ind. It will pass through Rockport, Midway, Tennyson, Montgomery and other places. At Elnora connection will be made with the Chicago, Milwaukee & St. Paul, while at Tennyson a similar connection will be made with the Southern Railway System.

The new project has been submitted to the Interstate Commerce Commission for approval.

In steam railroad circles in Chicago nothing tangible could be learned about the project. According to newspaper reports, the new road is to be financed by British capital. It is said that the project has been under consideration since 1915, but that due to the war and the high cost of materials immediately following the war, the actual construction was deferred until the present time.

No definite date has been set for construction work to start, although the necessary funds are said to be on deposit and the right-of-way options obtained through the various counties for the entire length of the road.

## Illinois Central Contracts for Electric Power

A 10-year agreement has been made by the Illinois Central Railroad with the Commonwealth Edison Company for supplying electricity to the railroad within the Chicago terminal district. This contract provides for optional extension to 1947. Under the terms of the agreement, the Commonwealth Edison Company will deliver for traction purposes 1,500 volts d.c. at the railroad right-of-way. The supply is to be available to the railroad by the beginning of the summer of 1926. It will be used for the operation of the Illinois Central suburban service.

Electrification of the company's right-of-way will extend as far as Matteson on the main line and will also include the South Chicago and Blue Island branches. Under the terms of the agreement, the Commonwealth Edison Company will build, maintain and operate seven substations located along the right-of-way. The agreement also provides for the installation in these substations of control equipment for the automatic signal system of the company and also for providing electricity for lighting the small suburban stations and the new central terminal station. Further particulars of this arrangement will be published later.

E. W. Lloyd, general contract agent of the Commonwealth Edison Company, acted for the company in making the agreement. He said:

> The acquisition of this business by the Commonwealth Edison Company means a further step in super-power development in this area. This development, over a long period of years, which has made possible the selling of energy in large quantities to railways, means a marked advance toward the electrification of all railroad terminals.

## End of Southern California Power Shortage in Sight

The normal California winter rainfall has set in unusually early. This breaks up an exceptionally prolonged drought. It is believed now that the power shortage, especially the shortage in hydro-electrically produced power, suffered in the State of California for the past five months will soon be eliminated. The Railroad Commission took charge on July 1 of the power shortage matter, instituting a vigorous electric power-saving campaign by ordering reduction of power consumption by all classes of users. Electric railway cars and industries generally are still curtailed approximately 20 per cent.

It is announced that the skip-stop system on the car lines in Los Angeles and other neighboring cities where local car lines are operated will be lifted and normal operation resumed Dec. 15. The Los Angeles Board of Public Utilities, in co-operation with the California State Railroad Commission, ordered the curtailment of service.

## Mr. Blair Discusses Co-ordination at Chicago

Henry A. Blair, submitting to a cross-questioning by members of the City Council on his offer to co-ordinate the Chicago Surface Lines with the elevated lines and a city-built subway, said there is no hope for Western utilities to attract money for legitimate investment as long as certain states adhere to short-term franchises.

Mr. Blair was accompanied by Leonard A. Busby, president of the south side lines, which are part of the Surface Lines. He said that his company would not yield a dollar from the price set of $162,000,000, the capital account value. Mr. Blair said:

> Why, we put $70,000,000 into the lines in a six-year period and $106,000,000 in a ten-year period since the 1907 ordinance. That's more than we are asking you to pay.

Mr. Busby backed up Mr. Blair's co-ordination plan and said he had submitted a separate offer for a partial sale only to help the city to see the possibilities in case the co-ordination fails.

The Aldermen also have before them an ordinance providing for universal transfers between elevated and surface cars and for the establishment of a transportation board similar to New York's.

## Bus Rights Sought in Toledo

A company headed by New York financial interests has applied to the Ohio Public Utilities Commission for permission to establish bus lines in Toledo. The incorporators of the new company, to be known as the Toledo Peoples Motor Bus Company, are: A. G. Gorley, R. W. Schumaker and J. L. Rhinock, New York, and John W. Winn, Jr., and George R. Effler, the two latter being associated with the law firm of Marshall & Fraser, Spitzer Building.

In its application the company specifies 12 different routes. The application names two types of buses to be used, one being of the double-deck type and the other single deck. The number of vehicles to be installed has not been announced.

City Law Director Dotson said:

> We will resist with all the facilities at our command the injection into the situation of bus competition.

President Ben Adams of the Toledo Traction, Light & Power Company said:

> The traction company handles 50,000,000 passengers a year. The only way we can continue to improve our system and expand and prepare for lower fares is to operate without competition.

The company plans to charge a 10-cent fare with universal transfer if it is permitted to operate.

## Hearing Before I.C.C. on 112-Mile Line

A hearing was held on Nov. 5 at Augusta, Me., before Examiner Haskell C. Davis of the Interstate Commerce Commission and the Maine Public Utilities Commission on the application of the Quebec Extension Railway asking for a certificate of public convenience and necessity authorizing it to construct a new line of electric railway from a connection with the Aroostook Valley Railroad at Washburn, Me., to the west line of the State of Maine, in Aroostook County, a distance of 112 miles. The proposed new line will be situated entirely in the County of Aroostook and will connect with the Bangor & Aroostook Railroad at Portage and with the Quebec Central Railroad at the west boundary of the State.

## Blame Fixed for International Railway Wreck

Responsibility has been fixed by the Interstate Commerce Commission for the rear-end collision between two three-car trains on the Buffalo-Niagara Falls high-speed line of the International Railway at Ellicott Creek crossing on Oct. 19, when four passengers were killed and many injured. The accident is ascribed as being due to lack of automatic block signals, absence of an adequate automatic train control device and failure of the motorman of the second train to maintain a proper lookout. These reasons are contained in the report of W. P. Borland, director of safety of the Interstate Commerce Commission, who investigated the accident in conjunction with inspectors of the New York State Public Service Commission.

The commission also criticised operating conditions on the Buffalo-Niagara Falls high-speed line with respect to the length of the intervals allowed between trains.

The report of the commission found no neglect on the part of members of the crew of the first train to send back flagmen to warn the second section that the first train was standing still near the bridge over Ellicott Creek.

According to the report of the commission, the motorman of the first section saw the onrushing second section nearing the rear end of his train. He started at once to run toward the head of his own train with the view of moving it out of the way, if possible. At the point of the accident the motors of the second train were turning over at the rate of 55 m.p.h. The commission found, however, the brakes had been set and were in good working order. The commission says the motorman of the second section had a clear view 1,500 ft. ahead, but did not attempt to bring his train to a stop until he reached the flagman 300 ft. behind the rear of the standing section. When he saw a collision was inevitable, he opened the door from the vestibule into the car and yelled to the passengers to move back into the train.

## Phoenix Insists on Making Test Case of Paving Issue

The test case of the Phœnix Railway of Arizona against the revoking of its franchise by the city has been referred by the United States District Court back to the state court. Following passage of the ordinance last spring revoking the franchise, the test case was taken to the state court, but there the railway sought intervention of the U. S. District Court, Judge Fred C. Jacobs of the district court has now decided it was not within the jurisdiction of that court, and remanded it back to the state court.

The revoking of the franchise came upon the initiation of Mayor Louis B. Whitney. It was charged by the city that the company had failed to live up to the conditions of its franchise particularly with respect to carrying out paving work. The controversy was the subject of an editorial in the issue of the ELECTRIC RAILWAY JOURNAL for March 1, 1924.

## Buses Compete with Railway in Hammond

Independent bus service was started n Nov. 2 in Hammond, Ind., by the ecently organized Calumet Motor Coach Company. Sixteen Yellow buses f the street-car type operate over six outes paralleling the lines of the Hammond, Whiting & East Chicago Railway and the local bus routes of the Gary Street Railway. Both railways urnish interurban as well as local service. One connects with the Chicago Surface Lines and the other operates to Gary. It was to feed the interurban hat the Gary Street Railway started us service some time ago at the Hammond end of its line. These routes do ot compete with the local service of he other railway.

Even with this seemingly adequate ervice for a city of 45,000, jitneys were permitted to operate very much s they pleased. After experiencing a ear of this competition, the Hammond, Whiting & East Chicago Railway asked he Board of Public Works for permits o run 10 buses to supplement the railway. It also agreed to add 10 double-truck, one-man cars and otherwise mprove service at a cost of $250,000. According to C. E. Lawrence, local manger of the railway, this proposal was ot heard by the Board of Public Works.

Recently a bus franchise was issued o Harold Miner, formerly a chiropractic in Hammond. The granting of the ranchise was followed quickly by the rganization of the Calumet Motor Coach Company and the appearance of 5 new city-type buses. Sixteen of hese are used for a regular schedule nd are manned by trained, uniformed rivers, directed by a transportation upervisor. According to the local railway people, the source of the financial acking was not divulged at the hearngs before the City Council.

Simultaneously with the granting of he bus franchise, the City Council assed an ordinance ruling the jitneys ff the streets. Jitney men who operate s taxicabs with meters on their vehiles are being arrested.

After a week of experience under the ew conditions it appears that the limination of the jitneys may partially ffset the new competition offered by he buses. During this past week the treet cars carried more passengers han during a corresponding period beore jitneys were removed.

## Property Owners Protest Suggested Removal of Tracks

Voluntary protests have been lodged y property owners, merchants and bout 200 individuals against the sugestion made some time ago by Mayor Hylan of New York regarding the likehood of eventually removing street ars from both Forty-second Street and 25th Street, in which the Third Avenue Railway operates. S. W. Huff, resident of the Third Avenue Railway, has also recently taken issue ith the Mayor on the matter. Mr. Huff went into the general subject at onsiderable detail. In referring more pecifically to the case of his own ompany Mr. Huff said that not only ould it be impossible to substitute buses to carry the present trolley loads, but that anything like an approximate bus capacity to achieve that result would congest traffic in important thoroughfares immeasurably beyond any congestion that the city has yet known. On the 125th Street line alone 20,000 bus trips a day would be needed to carry the traffic. A similar situation would result on Forty-second Street, Mr. Huff said.

## News Notes

**Railway Man Helps Fill Community Chest.**—In a Community Chest Campaign in Nashville, Tenn., closed on Nov. 3, to raise $225,000 for 30 welfare agencies the Nashville Railway & Light Company ranked highest as a single contributor. It donated $6,000 to the cause. Twenty-one departments of the company also ranked highest, giving 100 per cent for employee subscriptions. The campaign was under the direction of J. P. W. Brown, general superintendent of the company, who was publicity director and general chairman and to whom due credit should be given for its success. The $225,000 sought to be raised was oversubscribed to the amount of $17,580, with 32,360 subscribers. The company assisted in the campaign by advertising on each of its cars the need for the success of the campaign.

**Helena Company Would Increase Fares.** — Application of the Helena Light & Railway Company, Helena, Mont., for authority to increase the price of railway tickets from four for 25 cents to three for 25 cents and to charge 4 cents for school children's tickets instead of the present 3 cents, was heard on Nov. 6 by the State Public Service Commission. The commission also is asked by the company to annul the bonus provision in the company's city franchise.

**Feeder Bus Lines Authorized.**—Operation of feeder bus lines in the northern section of Indianapolis, Ind., by the Indianapolis Street Railway has been authorized by Mayor Lew Shank. Citizens of the district complained some weeks ago that they were not receiving adequate transportation facilities on the city lines after A. Smith Bowman, representing the People's Motor Coach Company, asked the Board of Park Commissioners for permission to operate bus lines on a preferred street in order to reach the district. Mayor Shank, however suggested at that time that the railway be given the privilege of operating feeder lines, which Robert I. Todd, president of the car company, said would be done. The buses will be purchased shortly.

**In the Interest of Safety.** — The Fourth Annual Foreman's School, which is a free course of lectures on industrial safety offered by the Massachusetts Safety Council, was started on Nov. 18 and will continue to Jan. 20 on each Tuesday evening at the Auditorium, 197 Clarendon Street, Boston. Edward Dana, general manager of the Boston Elevated Railway and a vice-president of the Massachusetts Safety Council, will act as chairman of the session scheduled for Dec. 2 and the speaker for that evening will be Cyrus S. Ching, director of personnel United States Rubber Company, New York. His subject will be "Organizing the Plant Safety Committees."

**Applies for 10-Cent Fare.**—The Oklahoma Railway, Oklahoma City, Okla., which secured an advance in fare from 7 to 8 cents about Oct. 1, will ask the Corporation Commission to grant a further raise of 2 cents, making the proposed rate 10 cents for cash fares, or three rides for 25 cents. John W. Shartel, president of the company, states that the 8-cent fare was followed by a further decline in traffic. The city cars carried 894,052 passengers in October, 34,000 fewer than were carried in August. September was not used in comparison for the reason that the Oklahoma State Fair traffic made the month abnormal. Mr. Shartel expresses the belief that the low point in the decline of traffic has been reached and that a 10-cent fare with three rides for 25 cents will add $8,000 a month to the company's income and be sufficient to save the situation. The 10-cent fare application was filed with the Corporation Commission in September following the bringing of a receivership action in the federal court by bondholders of the company. The 8-cent fare was granted by the commission in the hope that it would prove sufficient and that the application for 10 cents would not have to be pushed, but the company has found this hope of adequate relief futile. The company was authorized to install the $1.25 weekly pass.

**Will Operate Buses.** — The Tampa Electric Company, Tampa, Fla., is planning to put into effect as soon as present plans can be carried out an extension of the present car system by bus lines to suburban territory. P. O. Knight, president of the company, said that bus service would be started within a short time with six buses. The routes have not been decided on as yet, but the buses will run into the center of the city.

**Prepares Rerouting Plan.**—The Pittsburgh Railways, Pittsburgh, Pa., has prepared a plan of operating changes for rerouting cars to relieve congestion in the central business area. A preliminary step involves turning or short-looping certain of its lines at the outer edges of the downtown section through the use of its present track facilities. A final step embraces the entire preliminary step and involves short-looping of other lines, part of which require franchises from the city for the laying of tracks on certain thoroughfares which now contain no tracks, also "separation of grades," which suggests the construction and operation of an elevated loop structure on certain streets within the downtown business area. The company has submitted its complete general program to the traction conference board for its approval. Formal protest against the execution of the company's plan for rerouting cars in the downtown district was filed on Nov. 13 by the Retail Merchants' Association.

# Foreign News

## Earnings Up in Paris

Figures on street car and bus operation of the Paris Transports en Commun for the first six months of 1924 show the mileage greater than that of any other like period of their existence. The tramways operated 25,352,408 car-kilometers, an increase of 24,430 car-kilometers. This slight increase was due to motor bus competition. Motor buses covered 14,355,368 car-kilometers, an increase of 1,461,920 car-kilometers over the previous six months.

Receipts were 102,694,037 francs, an increase of 14,954,356 francs. Except for the fly-boats on the Seine, all operating receipts were satisfactory. These boats are to be discontinued during the winter months.

The number of passengers carried was 238,779,183, an increase of 15,505,750 over those of the previous six months. In spite of the increase in fares in the spring, passenger-kilometers increased 12 per cent.

## Glasgow Seeks to Protect Its Tramcar Riders

A demand for a Court of Criminal Appeal in Scotland is being made by the residents of Glasgow. This need has arisen from the frequent violation of the Scottish law providing that no motorist may drive between a standing tramcar and the curb until the roadway is clear of passengers.

In a recent instance a motorist killed a woman leaving a tramcar and severely injured one boarding the car. When the case was tried the jury found the driver not guilty, despite the evidence. This and a number of similar accidents has created the demand for a court to which prosecutors can appeal in case of flagrant violation of the law and unjust verdicts.

In England motorists are allowed to pass tramcars receiving or discharging passengers, although many accidents occur from the lack of legislation prohibiting this practice.

## Corsica Develops the Motor Bus

Motor bus services have been extended on the island of Corsica, near Nice, France, is the announcement made by the P. L. M. Railway. Practically every community on the island is now served either by rail or interconnected bus. Primarily intended to develop tourist travel in the Isle of Beauty, these bus services are supplying a real need to the scattered population, which has formerly traveled largely on muleback because of the present lack of any direct means of communication.

Three centers have been established for the head lines of the new service. From Ajaccio to Corte, via Piana, there is service once a week, the journey occupying two days. Another bus makes a once-a-week two-day circuit of Bavella and Bonafacio. From Bastia the trip to Cap Corse is made twice a week, to Orezza once a week and to Saint Florent twice a week. From Corte the Inzecca route runs once a week and a two-day journey once a week includes Corte, Piana and Ajaccio.

Corsica is probably the ideal motor-bus touring ground of the world and service is being developed in an intensive way on this basis. It was tried last year as an experiment.

## One-Man Express Bus Tried in Paris

The first of the express lines of motor buses in Paris began operation on Sept. 22 on the Passy-Bourse line.

Three stops are made near each terminus to allow passengers to enter and leave. The route of these express buses is somewhat shorter than that of the regular service and avoids the more crowded streets.

Fares are 1 franc for any distance. The passenger pays the driver on entering by the single front entrance, the fare being recorded on the ordinary type fare register. This one-man operation and the registering of fares is the first step in France toward putting fare collection on bus and street car services in line with similar operations in the United States.

The express service will not operate on Sundays or holidays.

## Mulhouse, France, Tramway Company Increases Capital

An increase in capital of 1,500,000 francs has been granted the Société des Tramways de Mulhouse, Alsace, France, by the Council General of the Upper Rhine. The new issue is to be used for electrification of the steam road from Mulhouse to Wittenheim and the line is to be continued to Theodore, a mining village. The line from Mulhouse to Battenheim will also be electrified.

## Edinburgh Corporation to Build Tramway Equipment

Six car bodies for the Edinburgh Corporation Tramways, Edinburgh, Scotland, are to be constructed in the municipal workshops of that city. This decision was made after receiving bids from manufacturers, the lowest received being £990 each, while the Corporation's estimate was only £750. It is stated that delivery will be much quicker.

**Sarthe Tramway to Experiment with Gasoline Car.**—A gasoline-propelled passenger car is about to be put into service by the Tramways de la Sarthe in Brittany, France, as an interurban feeder on the line between Grand-Luce and Saint Calais. The vehicle has a 40-hp. gasoline motor and carries 40 passengers, of whom 34 are seated. A trailer for baggage and package freight has a capacity of 7 tons.

**London, England, to Experiment with Heating Tramcars.**—The experimental fitting of five tramcars with heating apparatus, utilizing the heat from the motor resistances, is under consideration by the highways committee of London County Council. Owing to the mild winters and the large proportion of short-haul passengers few tramcars are equipped with heating apparatus.

**Tunnel Under Mersey River Discussed.**—Construction of a tunnel under the Mersey from Liverpool, England, to Birkenhead for vehicles and tramways is under consideration. The proposed tunnel would be about 2,400 yd. long and the estimated cost is £7,000,000. There is now a railway tunnel under the Mersey, but vehicles are taken across by ferries, which carry about 2,500 per day.

**British Railway to Electrify Another Line.**—Electrification of the steam line between Manchester, Oldham and Shaw, England, and a branch line to Royton, a distance of about 12 miles, will be begun at once by the London, Midland & Scottish Railway, according to an announcement made Nov. 4 by the directors. The third rail system is to be used and the cost, including various improvements and steel cars, is estimated at £600,000. This work is an extension of the electrification carried out by the Lancashire & Yorkshire Railway before the consolidation of the two companies.

**Havana Car Men Strike.**—A 24-hour strike of the platform men of the Havana Electric Railway, Light & Power Company, Havana, Cuba, was called Nov. 8 without warning to the public, as a protest against suspension of six employees charged with minor infraction of rules. Several of the union leaders were arrested, but were later released on bail.

**Argentine Railway to Be Modernized.**—The street car system of Rosario, Argentina, is to be extended and modernized. As the first step toward this end, the city engineer has issued specifications inviting bids on the work. These specifications, designated as Schedule No. E7210 Street Railways File No. 148834, are available at the Chicago and New York offices of the Bureau of Foreign and Domestic Commerce.

**Modern Transportation Planned for Moscow.**—Construction of a subway on the American plan, new tramways, the establishment of omnibus systems, taxi-cab lines and other improvements are being planned by the municipal authorities of Moscow, Russia. Loans to finance these projects are being sought in France, England and Germany.

**New Cars in Service on Paris-Versailles Railway.**—New motor cars have lately been put in service on the Paris-Versailles branch of the French State Railway. These differ in several important ways from the cars placed in service in 1921. Each car will have four 165-hp. motors, which will give a maximum speed of 70 km.p.h. (42 m.p.h.) The motors are also of a different type and certain changes have been made in their mounting.

# Financial and Corporate

## Suburban Holders Agree

### ast Obstacle to the Reorganization of United Railways, St. Louis, Removed

One of the last obstacles to a complete reorganization of the United Railways, St. Louis, Mo., was removed on ov. 17 by the announcement that representatives of holders of $6,500,000 of . Louis & Suburban bonds had agreed the terms of the reorganization committee for refinancing the railway system. The plan accepted provides for a chnical segregation of the suburban roperty, but for its operation by the me management as the remainder of e United Railways as part of the general city-wide system. The idea behind is arrangement is that if in the future becomes necessary through default of rincipal or interest on the bonds foreosure may be attained with a minium of legal procedure. The contract ill also pro rate the share of the light nd power contracts and franchise ghts of the companies.

Provision is also made for the immeiate payment of the $2,000,000 of Subrban consolidated bonds with interst at 8 per cent from Oct. 1, 1923, the ate of default. The general 5 per cent onds, totaling $4,500,000, will be exhanged for new bonds extended to July , 1934, with a sinking fund arrangeent that will retire $100,000 of such onds at par annually until 1934. This the same maturity date as the issue f $30,300,000 United Railways general and indicates that the reorganizers lan to refinance both issues at the me time. Interest for one year at 5 er cent will also be paid on the Subrban general bonds. In the event hat the United Railways desires to reire more than $100,000 of the Suburban onds in any one year it is to pay more han par for them.

Under the refinancing plan as now greed upon reorganizers will pay off 4,100,000 of underlying bonds, $2,000,-00 of Suburban bonds and $4,200,000 of eceiver's certificates. The issue of 9,790,000 of St. Louis Transit Company bonds will be retired at the rate of $300 cash and 5½ shares of new preferred stock for each $1,000 bond, with the privilege of purchasing 10 shares of new common stock at $12.50 a share for each bond.

There will be 53,845 shares of preferred and 352,645 shares of common stock in the reorganized company. Holders of 163,830 shares of the present preferred stock may purchase 1½ shares of new common stock at $12.50 a share for each share of preferred now held. If all exercise this privilege this will bring $4,438,000 cash to the new company.

Such common stock as is not taken by the Transit Company bondholders or preferred stockholders may be purchased by the holders of the present common stock, of which the North American Company owns approximately 72 per cent.

Under this plan the bonded indebtedness of the company would be reduced to $34,800,000, but a new issue of $8,000,000 will bring it to $42,800,000. The company will ask the Missouri Public Service Commission for the privilege of earning 7 per cent on a valuation of $57,200,000 already fixed by that commission.

## Four-Mile Line in New York Bankrupt

The Port Jervis Traction Company, operating between Port Jervis and the town of Deerpark, Orange County, N. Y., filed a voluntary petition in bankruptcy on Nov. 17 in the United States District Court. It was stated on behalf of the railway that the indebtedness was $165,419 and the assets $19,033.

Judge Henry W. Goddard appointed Harry T. Crist, Port Jervis, receiver under a $3,000 bond. The company also asked that its bus business be adjudged bankrupt, stating its liabilities amounted to $8,824 and its assets to $4,045.

According to its petition, the company operates on its surface car route 3.985 miles in a community of 10,171 people. Samuel M. Cuddeback, attorney for the company, recorded as one of its big items of indebtedness $70,000 of 5 per cent first mortgage bonds, held by the Orange County Public Service Company, Inc., Middletown, N. Y., with interest unpaid up to Oct. 1 of the current year, amounting to $27,527.

Other items listed as debts include State taxes of $213; taxes to the city of Port Jervis for 1921, $398, and for the current year, $374; county taxes, $3,224, and the Bank of Port Jervis, with an unsecured claim of $8,000.

Some of the assets are real estate, $10,000; receivable accounts, $3,208; vehicles, $5,100, and deposits of $725. Secured claims amount to $97,527 and unsecured claims $62,984.

## October Operations in Toledo Show Deficit

While showing a slight improvement over September, operations of the Community Traction Company, Toledo, Ohio, during October this year proved to be far under the similar month a year ago. Commissioner E. L. Graumlich reported a net loss of $27,268, bringing the total deficit to the stabilizing fund to $550,753, including the original $400,000 in the fund. Actual operating expenses were met in October and about half the bond interest and dividends on preferred stock earned.

Increase in passenger revenue over September was $24,373. Operating charges for the month totaled $224,722, including $15,000 set aside for extraordinary maintenance. Last year the operating expense in October was $251,883.

During October 3,831,612 revenue passengers were carried compared with 5,178,069 for October a year ago. September this year showed only 114,383 revenue passengers a day were carried.

Business has continued to pick up for the first half of November with an increase in revenue of $4,500 as compared with a similar period of last month.

## Successful Year in 1923

### Capital Traction Closes Unusually Active Year with Substantial Increase in Balance

The credit balance of the Capital Traction Company, Washington, D. C., at the close of 1923 was $1,524,240, an increase of $169,673 over the credit balance at the end of the preceding year. More than ordinary activities during 1923 included the taking over of the Kensington Railway, the extension of tracks over the Key Bridge, the installation of bus lines and the large amount of work done on repair, maintenance and construction.

The report states that the increased use of automobiles in and about Washington is still affecting the railway. The average daily number of passengers carried during 1923 was 188,090, which represented a loss of 3.15 per cent over the preceding year. The loss in traffic resulted in a corresponding reduction in revenue. Operating expenses decreased $39,025 despite the fact that much money was utilized in the installation of bus service.

In February, 1923, bus service was substituted for operation on Con-

SUMMARY OF OPERATIONS OF CAPITAL TRACTION COMPANY YEAR ENDED DEC. 31

| | | 1923 | 1922 |
|---|---|---|---|
| Passenger revenue, railway | | $4,797,909 | $4,966,341 |
| Bus revenue | | 21,411 | ..... |
| Special car revenue | | 106 | 20 |
| Total revenue from transportation | | 4,819,426 | 4,966,361 |
| Revenue from operation other than transportation | | 23,192 | 27,682 |
| Railway operating revenue | | 4,842,619 | 4,994,044 |
| Operating expenses (64 117 per cent gross revenue) | | 3,128,186 | 3,167,211 |
| Net operating revenue | | 1,714,432 | 1,826,832 |
| Taxes assignable to railway operation | | 409,031 | 436,093 |
| Operating income | | 1,305,400 | 1,390,739 |
| Non-operating income | | 34,725 | 34,906 |
| Gross income | | $1,340,126 | $1,425,645 |
| Deductions from gross income: | | | |
| Interest on funded debt | $280,300 | | |
| Interest on unfunded debt | 22,950 | | |
| Miscellaneous rents | 1,317 | | |
| Rent for leased roads | 12,832 | | |
| Miscellaneous debits | 4,372 | | |
| Total deductions | | 321,773 | 320,655 |
| Net income | | $1,018,352 | $1,104,992 |

PROFIT AND LOSS STATEMENT

| | | | |
|---|---|---|---|
| Credits: | | | |
| Balance at beginning of year | $1,354,567 | | |
| Net income for year | 1,018,352 | | |
| | | 2,372,919 | |
| Debits: | | | |
| Dividends | 840,000 | | |
| Excess cost of reconstructing Kensington Railway tracks | 8,669 | | |
| Miscellaneous | 10 | | |
| | | 848,679 | |
| Credit balance at close of year | | $1,524,239 | $1,354,567 |

SUMMARY OF OPERATIONS PER REVENUE PASSENGER IN CENTS

| | 1923 | 1922 |
|---|---|---|
| Passenger revenue | 7 02 | 7.01 |
| Other revenue | 08 | .08 |
| Gross revenue | 7 10 | 7 09 |
| Operating expenses | 4 56 | 4 47 |
| Taxes | .59 | .61 |
| Interest and other deductions | .47 | .45 |
| Operating expenses, taxes, interest, and other deductions | 5 62 | 5 53 |
| Net income | 1.48 | 1 56 |

SUMMARY OF OPERATIONS PER CAR-MILE IN CENTS

| | 1923 | 1922 |
|---|---|---|
| Passenger revenue | 49.55 | 52 00 |
| Other revenue | .59 | .65 |
| Gross revenue | 50.14 | 52.65 |
| Operating expenses | 32.16 | 33.16 |
| Taxes | 4 20 | 4 56 |
| Interest and other deductions | 3.31 | 3.36 |
| Net income | 10.47 | 11.57 |

REVENUE AND TRANSFER PASSENGERS

| Number of passengers carried: | 1923 | 1922 |
|---|---|---|
| At 8 cents | 16,562,845 | 15,303,295 |
| At 7 cents | ..... | 9,263,546 |
| At 6⅔ cents | 50,791,651 | 45,025,583 |
| At 5 cents | 923,001 | 972,779 |
| At 3 cents | 304,206 | 321,724 |
| Number of cash passengers carried on Kensington line | 27,555 | ..... |
| Number of ticket passengers carried on Kensington line | 43,612 | ..... |
| Total revenue passengers | 68,652,870 | 70,886,927 |
| Other passengers: | | |
| 1-cent intercompany transfer passengers | 2,803,125 | 2,636,136 |
| 2-cent bus to car transfer passengers | 126,295 | 1,009 |
| 2-cent car to bus transfer passengers | 94,814 | |
| 2-cent Eastern High School tickets | 3,057 | |
| Free car to bus transfer passengers | 179,563 | 202 |
| Capital Traction Company free transfer passengers | 17,368,473 | 18,182,305 |
| Other free passengers: | | |
| Employees | 844,715 | 883,835 |
| Policemen and firemen | *76,403 | *82,496 |
| Total passengers | 90,149,315 | 92,672,910 |

*Exclusive of policemen and firemen riding free while in uniform.

necticut Avenue, on May 17 a bus line was established at Fourteenth and Kennedy Streets and on Aug. 1 the operation of a bus line from Eleventh Street was put under way. Again on Dec. 1 a bus line was established from Seventeenth Street and Pennsylvania Avenue. Eight buses were purchased at a total cost of $56,876. On the subject of bus operation the company states that the operation of these lines must, for the time being at least, result in some loss financially, but the company believes it is essential to establish the policy that all urban transportation should be furnished by the existing street railway companies wherever the need for it is positively shown. The additional transportation can be furnished much cheaper, for the present at least, by buses than electric lines on account of the high cost of conduit track construction.

### FUNDED DEBT UNCHANGED

There has been no change in the company's funded debt. Of the total authorized issue of $6,000,000 first mortgage 5 per cent bonds maturing in 1947, $200,000 are held in the treasury and $194,000 have been repurchased and are held in the fire insurance reserve. Capital expenditures for the year amounted to $392,380. No change has been made in the method of accruing depreciation for several years past. The total amount accrued was $424,060. Charges against the reserve were $178,245, leaving a net accrual of $245,815. The balance in reserve on Dec. 31 was $1,665,474, of which $806,000 was invested in United States securities, $48,571 deposited in interest-bearing accounts and $810,902 advanced for capital expenditures. Tax accruals for 1923 were $439,031.

The three-year contract covering wages and working conditions which expired on March 30 was renewed for another three-year period through direct negotiations without the necessity of arbitration. In the history of the Employees' Relief Association, the year 1923 was the most prosperous. After charging off expenditures for sick and death benefits and all other expenditures the year's operation showed a net profit.

The accompanying tables show the year's operation *in toto* and per car-mile and some passenger statistics.

## Terms of Holyoke Power House Sale Announced

The stockholders of the Holyoke Street Railway, Holyoke, Mass., meeting there on Nov. 18, ratified the action of the board of directors of the company in arranging for the sale of the railway power plant to the Turners Falls Power Company.

By the terms of the agreement the railway will receive $400,000 for the plant, but will agree to take power from the power company for a period beginning Jan. 1, 1926, and extending to Dec. 31, 1945. It is agreed, however, that the power company can begin to furnish power to the railway prior to the date mentioned if equipped to furnish such service. The power company has already made connections with railway lines at various points, except in Holyoke.

At the base rate of 0.018 cent per kilowatt-hour the minimum payment by the railway for power would be $117,000.

## Jitney Competition Hurtful in Atlanta

For the fourth consecutive month the receipts of the railway department of the Georgia Railway & Power Company, Atlanta, Ga., have shown heavy losses as compared with the figures for 1923, the loss for October amounting to $41,269. This is the largest decrease in revenues of any month this year with the exception of September, which showed a loss of $47,000.

With $38,779 for July on the wrong side of the ledger and $35,904 for August, revenues of the railway department for the past four months are now $162,954 under those for the similar period in 1923.

It will be recalled that the railway failed by more than $565,000 in 1922 and by more than $589,000 in 1923 to earn the amount set by the State Public Service Commission as a fair return on the commission's minimum valuation of the property. This year it will fail by a much greater amount to yield a fair return.

In view of these conditions the company has again called attention to the petition before the City Council asking that steps be taken to put the railway on a self-sustaining basis. The company says that the figures for the past four months should be convincing proof of the statements contained in the petition and made by officials at the public hearings last January that unless relief is given it will be impossible to continue the railway service. The losses are considered to be due largely to unfair jitney competition.

**Date of Conspectus Announced.**—The Conspectus of Indexes prepared by Albert S. Richey will be published in the ELECTRIC RAILWAY JOURNAL, issue of Nov. 29.

**Railway Buys Bus Line.**—The Jamestown-Dunkirk Transit Company, which operates several buses between Jamestown and Dunkirk, has been sold to the Buffalo & Erie Railway, Buffalo, N. Y., according to advices of George MacLeod, general manager of the transit company. It is planned to operate the bus line in conjunction with the railway company.

**Service Discontinued.**—Service on the South Side loop of the Jamestown Street Railway, Jamestown, N. Y., has been discontinued. The territory is now served by a bus line, except during the rush hour, when the trolley cars will run. The South Side trolley line was built many years ago and is one of the lines on which horse cars were first used. The line was electrified about 1890.

**Passenger Revenue Increases.**—For the ten-month period ended Oct. 31, 1924, the Philadelphia Rapid Transit Company, Philadelphia, Pa., had a net income of $1,709,590 against $1,705,163 for a similar ten-month period ended Oct. 31, last year. The number of passengers carried showed a falling off being 755,724,687 in 1924 and 758,262,226 in 1923. The passenger revenue however, increased. It was $36,494,359 for the ten months of 1923 and $36,659,484 for the period of January through October, 1924.

**Makes Offer to Sell Toronto Line.**—The York Township Council has received an offer from Sir Henry Thornton, head of the Canadian National Railway, to sell on behalf of that system the section of the Toronto Suburban Railway lying between the city limits and Weston. The price is given as $15,000. Sir Henry's suggestion also included bettering transportation conditions in the district. Prices mentioned were $25,000 for the portion of the radial within the Weston town limits and $15,000 for the southern end running through Mount Dennis into the township. A point in the offer was that the municipalities were not obliged to take over any of the present rolling stock of the radial line. It was stated that the Toronto Transportation Commission was willing to assume operation of the line provided satisfactory financial arrangements were made.

**Net Income Increases.**—For the four-month period ended Oct. 31, 1924, the Brooklyn-Manhattan Transit Company, Brooklyn, N. Y., and its affiliated com-

panies had a total operating revenue of $14,360,028 against $13,020,657 for a similar period of last year. The expenses showed an increase from $8,645,726 for the four-month period ended Oct. 31 of last year to $9,424,390 for the four months of the current year. The net income advanced from $1,184,168 for the four-month period ended Oct. 31, 1923, to $1,681,863 for the similar four months of the current year.

**Operating Ratio 75 per Cent.**—The report of the Madison Railways, Madison, Wis., for the year up to Aug. 31, shows total revenues at $411,679, while operating expenses, not including interest or depreciation charges, were $311,352, or a little more than 75 per cent of the total amount taken in. The number of revenue passengers carried during the year decreased 190,000 over the two preceding years. These facts were contained in a recent audit made by the Railroad Commission. The company some weeks ago announced a comprehensive program of replacements and extensions to its system.

**Deficit Increased.**—For the nine-month period ended Sept. 30, 1924, the International Railway, Buffalo, N. Y., reported an operating income of $7,741,174 against $8,065,828 for the similar nine months in 1921. The operation and taxes showed a falling off, being $7,062,555 in 1921 and $7,043,486 in 1924. The gross income fell off from $1,033,769 in 1921 to $736,435 in 1924. After the consideration of income deductions the nine-month period of 1924 showed a deficit of $353,963 against a deficit in 1921 of $91,209. The company states that because of the strike in 1922 and its effect on the revenue and operating costs of the year 1923 the calendar year 1921 is used for comparative purposes.

**Holdings Transferred.** — The stockholdings of the Barnsdall Corporation of New York, which controlled the Moncton Tramways, Electric & Gas Company, Moncton, N. B., Canada, have been transferred to the Stevens & Wood interests of New York. Reference to the Canadian undertaking changing hands was made in the ELECTRIC RAILWAY JOURNAL, issue of Oct. 4, 1924. About 2.5 miles of electric railway in Moncton are involved. The Barnsdall Corporation disposed of its interests for approximately $500,000. This stock was carried on the company's balance sheet at $105,780.

**Changes Hands.** — The Wellsburg, Bethany & Washington Railway, Wellsburg, W. Va., has recently changed hands and plans have already been laid by the new owners, the Buffalo Valley Collieries Company, to extend the line to Washington, Pa. For many years there has been discussion about this extension. The leasing of the line was referred to in the ELECTRIC RAILWAY JOURNAL, issue of Aug. 23, 1924.

**New Manhattan Railway Directors.**—At the annual meeting of stockholders of the Manhattan Railway, New York, on Nov. 12, James F. Hughes, William Dean Embree and John Nordhouse were elected to fill vacancies on the board of directors. The Manhattan Railway owns 140 miles of elevated railway leased by the Interborough Rapid Transit Company.

# Personal Items

## A. J. Manson Advanced

### Well-Known Westinghouse Official Is Made Manager of Company's Heavy Traction Division

A. J. Manson, manager of the transportation division of the New York office of the Westinghouse Electric & Manufacturing Company for the past four years, has been promoted to manager of the heavy traction division of the railway department with headquarters at East Pittsburgh.

Mr. Manson is considered one of America's foremost authorities on railroad electrification. He joined the Westinghuose company through its engineering apprenticeship course about nineteen years ago. Just before that he was graduated as an electrical engineer from the Massachusetts Institute of Technology.

His long service with the Westinghouse company has included every branch, from construction to sales. As a result Mr. Manson has been connected with the work of solving nearly all of the important electric transportation problems in the eastern part of the United States. They include helping to build and test the first New Haven locomotive; being assigned to the electrification work of the New York, New Haven & Hartford Railroad in the spring of 1907 and aiding in the inauguration of electric service; instructing steam engineers in their duties as electric enginemen, and qualifying the early ones for electric service, and being associated with the preliminary test conducted by the Pennsylvania Railroad on Long Island prior to the decision as to the system to be used in the Pennsylvania tunnels entering New York City.

Another accomplishment of Mr. Manson was assisting F. H. Shepard, director of heavy traction of the Westinghouse company, in connection with the Pennsylvania-New York tunnel electrification. This installation included power house, substations and locomotives. Mr. Manson is well known throughout the electrical and railway world through his book "Railroad Electrification."



©Underwood & Underwood

A. J. Manson

## R. L. Peterman in Charge of Spartanburg Property

R. L. Peterman has assumed charge of the local utilities at Spartanburg, S. C., recently bought up by W. S. Barstow & Company. Mr. Peterman entered the utility field at Charleston, in the electric light division of the utilities company. He later went to Binghamton, N. Y., with the Binghamton Light, Heat & Power Company, another Barstow property, as general manager, succeeding Robert N. Hodgson. At one time Mr. Peterman was superintendent of the Pennsylvania Utilities Company.

As vice-president and general manager of the South Carolina Gas & Electric Company in Spartanburg Mr. Peterman has the problem of restoring railway service, which has been abandoned on practically all lines for the past few years. One of his first steps on assuming charge of the Spartanburg property was to petition the City Council for permission to operate bus lines in conjunction with the railway lines. In addition to his duties in Spartanburg Mr. Peterman also has charge of the Columbia Railway, Gas & Electric Company, another recently purchased Barstow property.

## G. E. Emmons Retires from General Electric

George E. Emmons has asked to be relieved of his duties as vice-president of the General Electric Company in charge of manufacturing. Mr. Emmons is a pioneer in the electrical industry. He has been actively engaged in the management and development of the production department of the General Electric for nearly thirty years. During his administration the Schenectady plant attained its present immense proportions, and he has also been instrumental in the development of the company's plants in other places. He began his electrical work with the old Thomson-Houston Company in 1886. When that organization was merged with the General Electric Company he was retained on the staff.

In 1895 he was made general manager of the plant at Schenectady and in 1916 was elected to the office of vice-president. Two years ago Mr. Emmons was decorated by the Japanese government in recognition of his services in introducing electrical machinery into Japan and of his contributions to the development of the electrical industry in that country.

In commenting on his resignation Gerard Swope, president of the company, said:

> Mr. Emmons has served the company loyally, whole-heartedly and indefatigably

for almost forty years. He has met his arduous responsibilities not only with outstanding ability, but in a manner which has won and held the respect and affection of workers in all grades of service throughout the organization.

## Willis A. Lovejoy New Superintendent of Maine Property

Willis A. Lovejoy has succeeded Sterling T. Dow as superintendent of the York Utilities Company, operating between Sanford and Biddeford and from Town House to Kennebunkport and Cape Porpoise, Me. Mr. Dow, whose resignation was referred to recently in the ELECTRIC RAILWAY JOURNAL, has accepted a similar position in Portland. His successor was elected at a meeting of the board of directors on Oct. 29, but the promotion did not become effective until Nov. 1. Mr. Lovejoy has been associated with the Maine property, formerly the Atlantic Shore Line, for twelve years. He was first employed as shop foreman at Dover, N. H., when the Dover and Portsmouth branch was in operation, and later as master mechanic at Town House. Mr. Lovejoy originally went to the Atlantic Shore Line from Lewiston, where he was in charge of the carhouse of the old Lewiston, Brunswick & Bath Railroad.

George Hanscomb, for many years connected with the York Utilities Company, both in the operating and executive departments, was chosen assistant superintendent.

**E. L. McCulloch**, who was assistant to C. D. S. Johnson, president of the old Denver & Laramie Railroad and the Seeing Denver Electric Railway Company, and who piloted the canvass of Rice Means until he was elected United States Senator in the November election, has been appointed secretary to Colonel Means. Mr. McCulloch is a former newspaper man.

**Carl Bacon**, for the past four years chief electrical engineer of the Olean, Bradford & Salamanca Railway, with headquarters at Olean, N. Y., has resigned. He will become connected with the Texas Company, New York.

**H. G. Butler** would seem to be nearing the end of his duties as state power supervisor in California. The emergency during which he has been serving has about passed. With the impending finish of the necessity for power saving, much praise is to be extended for the qualities of firmness, tact, consideration and quiet efficiency shown by Mr. Butler. The State Railroad Commission had full jurisdiction over the power-saving campaign, and that body selected him for the position of state power supervisor principally due to the skill he displayed in similar executive work during war-time conservation. In the work now drawing to a close Mr. Butler has, more or less, occupied a buffer position between the public utilities, including the electric railways, and consumers, and he has performed the near miracle of apparently satisfying all parties and bringing about civic teamwork. Under a less competent hand, confusion might easily have resulted. Mr. Butler is a consulting engineer in private practice in San Francisco.

## Mr. Butler Named Senator

### Electric Railway President Appointed by Governor to Succeed the Late Mr. Lodge of Massachusetts

William M. Butler, president of the Boston & Worcester Street Railway, Framingham, Mass., and the Boston & Worcester Electric Companies, was appointed on Nov. 13 by Governor Cox of Massachusetts to fill until the next general State election in 1926 the seat in the United States Senate left vacant by the death of Henry Cabot Lodge. Mr. Butler led Calvin Coolidge's preconvention campaign for the Presidential nomination and was chairman of the Republican national committee in the recent election. He will continue in that capacity.

From the eighth floor suite of offices at 77 Franklin Street, Boston, Mr. Butler has long kept a watchful eye on the operations of his several textile properties, an electric railway and the political horizon. Visitors concerned with one or another of these fields of activity come and go in a constant stream. Like the late Senator Crane and like the silent man of the White House, Mr. Butler is a doer rather than a talker. By his own efforts he has made a fortune in the textile industry, controlling some of the best properties in New England, and has found time to take an effective part in politics, state and national, for many years. He has a vigorous physique, is alert of mind and is endowed with charm of personality.

A year ago, before Mr. Butler threw himself into the Coolidge campaign, it was said of him that politics was his hobby, his recreation. It was said that he loved the game, but that he was merely a fan. However, he proved himself to be an adept at the game when he took it upon himself to participate as a player.

Mr. Butler is a minister's son. His father, James D. Butler, was formerly a sea captain of New Bedford, and later was ordained a clergyman in the Methodist Episcopal Church. His mother was Eliza B. Place. William was born in New Bedford on Jan. 29, 1861. He received his education there, and before deciding to make law his life profession, worked as a bookkeeper. Then he attended Boston University, graduating with his law degree in 1884, and setting up an office in New Bedford. He got his first taste of politics by being elected to the New Bedford City Council and to the State Legislature. But he was Councilman, Representative, Senator, and then he quit being a candidate for office and became a manager. It was then that Senator Crane took charge of his destiny.

Mr. Butler moved to Boston and his law practice expanded. He acquired interests in various business concerns, chiefly textile interests and the Boston & Worcester Street Railway. He kept in touch with legislation and took up politics as his hobby. When Crane was in Washington Mr. Butler was his spokesman in Massachusetts.

Besides being president of the Boston & Worcester Street Railway, Mr. Butler is head of the Butler Mill, Hoosac Cotton Mills, New Bedford Cotton Mills Corporation, and Quissett Mill. He has been a trustee of Boston University and a member of a half dozen exclusive clubs.

In urging the appointment of Mr. Butler to public office the Boston *News Bureau* paid him this fine compliment:

> Nobody is better equipped, nobody has shown higher talent, to uphold the Coolidge program than William M. Butler. He may not want the task. Private business is calling for his attention, as it is calling for the attention of many valuable members of the Cabinet. But is it not a duty for them all to sacrifice still further personal considerations and plant the United States solidly on world reconstruction with reduction of government interference and reduction of taxation?
>
> Is not one of the keynotes of this situation the appointment of William M. Butler by Mr. Cox to uphold the hands of the administration and the policies of President Coolidge? And is it not the duty of Mr. Butler to accept?

# Obituary

**Martin F. Delahanty** died suddenly on Oct. 23 at his home in Buffalo, following a stroke the day before. He had been connected with the International Railway, Buffalo, for 27 years in various capacities. At the time of his death Mr. Delahanty was foreman of the electrical department.

**E. A. Gregory**, district sales manager of the American Brake Shoe & Foundry Company, New York, with headquarters and residence at Houston, Tex., died on Nov. 1 in New York, following a severe illness and operation. Mr. Gregory was a most lovable character and a general favorite with a large number of friends, acquaintances and railroad officials, particularly in territory comprising the States of Louisiana, Mississippi, Texas, Arkansas and Oklahoma. He was born in Nashville, Tenn., on March 22, 1877, and took up railroad work in 1900 with the Nashville, Chattanooga & St. Louis Railway. In 1903 he was appointed foreman of terminals of the Louisville & Nashville Railway at Nashville, Tenn., which position he held until he entered the employ of the American Brake Shoe & Foundry Company on Jan. 15, 1909. On March 1, 1923, he was appointed district manager of the company, with headquarters at Houston.

**Frederick Alfred Boutelle**, a pioneer in the electric railway industry, died on Nov. 4 at the home of his daughter in Portland, Me. He was identified with transportation companies on the Atlantic coast, the Pacific coast and in the central states for more than 45 years. At the age of 18 years, he entered the employ of the Delaware & Hudson Canal Company in the capacity of telegrapher. Some years later he was promoted to chief dispatcher. He continued in this position until 1901, when he resigned to become general superintendent of the Hudson Valley Electric Railway, Glens Falls, N. Y. In 1902 he became superintendent of transportation of the Columbus, Buckeye Lake & Newark Traction Company and the Columbus, Newark & Zanesville Electric Railway. In 1905 he resigned this position to become general superintendent of the Tacoma Railway & Power Company and the Puget Sound Electric Railway at Tacoma, Wash. He held this position until he retired in 1913. Mr. Boutelle was 73 years old.

# Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

## Electrification Progressing in Europe

**Roads Are Planning to Handle Greater Traffic and Already Have in Use Over 3,000,000 Hp. of Locomotives**

Marked activity in electrification all over Continental Europe was observed by Frank H. Shepard, director of heavy traction of the Westinghouse Electric & Manufacturing Company, who returned to New York last week after a month's trip to France, Italy, Spain, Switzerland, Czechoslovakia, Germany, Holland and England. In an interview with representatives of this paper he said that the work of electrification on the Continent is in full swing. Plans are being made for the future, so that the railroads can handle greatly increased traffic.

Installations in progress or already in operation on the railways in Norway, Sweden, Germany, Austria, Switzerland and Italy, using alternating-current trolley systems, single-phase or three-phase, now have in use or on order locomotives totaling some 2,500,000 hp. In France, England, Spain and Holland, where the direct-current systems are used, some 600,000 hp. of locomotives are built or building.

While in the past American manufacturers have supplied considerable electrification material for European roads, Mr. Shepard is of the opinion that in future the nationalist movements in the leading European countries will result in the production locally of more and more of their equipment. This movement has even gone so far as to affect the decision for electrification systems, particularly in France, where direct current was adopted in part to prevent interchangeability with Germany, which uses the single-phase system.

### American Experience Still Needed

Mr. Shepard felt that despite the movement for patronizing home industries, American engineering experience and the leading position of this country in the electrical industry will make the assistance of our manufacturers essential, so that they may expect to participate in European electrification work for a long time to come. Of course, he said, we must bear in mind that foreign countries have gone much further than America in electrification work, having three to four times as many miles operated in this manner, although the United States has over half the world's railroad mileage.

What is needed here, he said, is that the railroads get away from the present plan of going along day by day, which has come as a result of over-regulation and adverse legislation, and adopt a broad policy looking toward the future. Greater stability in the political situation should bring this nearer than it has been. Electrification should then be considered not as a means of replacing steam but of giving a service impossible with present operating methods.

## $8,250,000 for New Equipment

The Illinois Central Railroad on Nov. 19 awarded contracts for $8,250,000 of new equipment. This includes 130 motor cars to be built by the Pullman Car & Manufacturing Company and 85 trailers by the Standard Steel Car Company. The contract for the entire electric control equipment was awarded to the General Electric Company. The motor order was divided between the General Electric Company and the Westinghouse Electric & Manufacturing Company, each company to furnish 50 per cent. Deliveries of cars and electric equipment shall start March 1, 1926, and shall be completed by July 1, 1926. Except for the electric equipment these cars will be similar to the 45 purchased during the last three years, which are now hauled by steam engines. The motor cars will carry pantographs and will be arranged for multiple-unit control from either motor or trail car.

## Brooklyn Car Order Placed

Final decision has been reached by the Brooklyn City Railroad, Brooklyn, N. Y., concerning the placing of its order for 335 double-truck four-motor cars. Of these 150 will be built by the J. G. Brill Company, the trucks being built by Brill; 100 by the St. Louis Car Company and 85 by the Osgood-Bradley Car Company. Motors for the entire complement will be supplied by the Westinghouse Electric & Manufacturing Company. Westinghouse Air Brake Company will furnish the air brakes. Some details of the other equipment of the cars remain to be settled and announcement concerning them probably will be made in the near future.

## Metal, Coal and Material Prices

| Metals—New York | Nov. 18, 1924 |
|---|---|
| Copper, electrolytic, cents per lb. | 13.938 |
| Copper wire base, cents per lb. | 16.25 |
| Lead, cents per lb. | 8 65 |
| Zinc, cents per lb. | 7.25 |
| Tin, Straits, cents per lb. | 54 75 |
| **Bituminous Coal f.o.b. Mines** | |
| Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons | $4.325 |
| Somerset mine run, Boston, net tons | 2.05 |
| Pittsburgh mine run, Pittsburgh, net tons | 1.875 |
| Franklin, Ill., screenings, Chicago, net tons | 1.375 |
| Central, Ill., screenings, Chicago, net tons | 1.275 |
| Kansas screenings, Kansas City, net tons | 2.00 |
| **Materials** | |
| Rubber-covered wire, N. Y., No. 14, per 1,000 ft. | $6.65 |
| Weatherproof wire base, N. Y., cents per lb. | 18.25 |
| Cement, Chicago net prices, without bags | 2.20 |
| Linseed oil (5-lb. lots), N. Y., per gal. | $1.13 |
| White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots | 0.152 |
| Turpentine (bbl. lots), N. Y., per gal. | 0.85 |

## Local Firm Favored for Detroit Bus Bid

Following a hearing on Nov. 14 before the Detroit City Council in committee, it was decided to award a contract for 50 double-deck buses for the Department of Street Railways to the Standard Motor Truck Company, a local concern. The Street Railway Commission had previously recommended that the bid of the Yellow Coach Company, Chicago, be accepted, although that concern's bid was $11,250 a bus and the Standard Company's bid was $9,500. Final action has not yet been taken. Even after the contract is awarded the Council can reconsider its action any time within several days.

Ross Schram, general manager, suggested that if it was desired to encourage the bus building industry in Detroit, the Council should reject the bids now under consideration and readvertise so as to purchase 25 buses of known quality from the Chicago firm and distribute contracts for 25 among the Detroit manufacturers. He suggested that the commission be permitted to provide new specifications.

It was pointed out by the commission that Yellow Coach buses were wanted by the Street Railway Department in extending its transportation service because those buses met all the requirements specified by D.S.R. engineers and were manufactured by a concern which has put out hundreds of buses similar to those desired for use in Detroit, while the Standard company has made only single-deck buses.

Mr. Schram also questioned the assumption that the Standard's bid was the lowest. He cited that the bid was on a type of bus that differed in five or six important details from that of the other company.

A tentative agreement has been reached by the D.S.R. under which the department may rent single-deck buses from Dodge Brothers, Inc., for suburban use with the understanding that the rental paid may be applied on the ultimate purchase price if the city decides to buy the buses. The D.S.R. has been given authority to advertise for open bids on such a rental project.

## Glasgow Corporation Rejects American Bid

The Glasgow Corporation turned down on Nov. 13 the recommendation of the tramway committee to place a contract for special trackwork with the United States Steel Products Company. Its offer was £7,850, or £800 less than the lowest British offer, which the corporation decided to accept. The vote of the corporation was 73 against acceptance to 17 in favor.

In making his motion that the work be given to the lowest British bidder, Counselor Walker said that the American company refused to recognize the elementary right of workmen of combining to protect their interests and that the Americans were throwing their goods in England at lower prices than they charged in the home market so as to destroy any revival of trade in Britain.

## Car Order Delayed

### Grand Rapids Railway Intends to Conduct Test of Vehicles Supplied by Three Manufacturers

Louis J. DeLamarter, vice-president and general manager of the Grand Rapids Railway, has announced he has secured the co-operation of three of the leading car builders in the country for a comprehensive test on the lines of his company of three types of street car which will embody the latest ideas in car construction.

Cars will be entered in the competition by the Light Weight Noiseless Electric Street Car Company, Minneapolis; the St. Louis Car Company, St. Louis, Mo., and the J. G. Brill Company, Philadelphia. These cars are to be light-weight, double-truck, single-end type, arranged for both one-man and two-man operation. Definite details of the cars in the contest have not been settled. It is expected the cars will be delivered to the railway about Feb. 1, 1925. They will be operated through the winter, given the severest tests possible and a decision reached in the early spring by the railway with respect to the award of a large order for new cars.

The average weight of the cars to be replaced is about 47,000 lb. The new cars will weigh about 24,000 lb., but will have the same seating capacity as the cars it is intended they shall replace. They will be 36 ft. 8 in. long, equipped with double folding front and rear doors. The roof will be of the plain arched type and will be made of Haskelite. The interiors will be finished in mahogany.

One or more of the cars will be equipped with Mead cushion wheels, a new departure in street car construction. This wheel has a steel tire with rubber core, designed to eliminate any shock. Another feature is to be a brake band which will operate on large brake drums attached directly to the axles, the same as on automobiles. In order to install the band brake it has been necessary to redesign the truck to make it inside hung and not outside as at present. An adjustment device is to be so arranged that any slack in the brakes may be quickly taken up from time to time. One of the cars doubtless will be equipped with hydraulic brakes. Four 25-hp. motors will be installed on each car.

There are to be emergency door openings at the rear, but the operator will be prevented from starting the car until the emergency door has been closed. The cars are also to be equipped with an outside control valve to permit a street man to open the rear door from the outside, collect fares, let passengers on and otherwise speed up car loading. In addition to the air brake the cars will be equipped with a Peacock staffless hand brake for emergency use.

The windows will be made to be raised instead of being lowered into a slot. Footrests are to be designed for just the proper height and reach for restful posture. The seats will be extra wide. The seats and backs will be spring filled and made of rattan. One of the cars will have plain floors and another will have mosaic rubber tiling. Electric heaters will be used. There will also be a new and improved design of wheel guard and fender.

Air-operated track scrapers will facilitate the work of keeping the right-of-way open after heavy snowfalls. The latest approved safety car electric lighting fixtures will adorn the new cars. For the local service it was considered advisable to adopt the folding step to which the riding public is accustomed. Large illuminated destination and routing signs will be used, the destination sign on the upper part of the vestibule, the route sign on the dash. All the car trimmings will be in bronze, polished and lacquered.

A new feature of at least one of the cars will be the observation end. The rear vestibule will be provided with seats all around, giving an unobstructed view of both sides of the street.

During the test period the cars will be painted different colors to distinguish them and make it easy for the public to give each a trial.

## *Rolling Stock*

**Indiana Service Corporation, Fort Wayne, Ind.,** is in the market for the purchase of 15 new light-weight interurban cars.

**Detroit United Railway, Detroit, Mich.,** has placed an order with the G. C. Kuhlman Car Company for the construction of 10 new light-weight interurban cars which will be similar in design to the last group of cars built by the Kuhlman company for the Detroit United.

**Portsmouth Public Service Company, Portsmouth, Ohio,** is changing over six light-weight double-truck cars for one-man operation. These cars will be equipped with Safety Car Devices Company equipment and will have the exit at the rear. They will be similar to the three new cars now being built for this company by the Cincinnati Car Company.

## *Track and Line*

**Community Traction Company, Toledo, Ohio,** is doing temporary repair work on Cherry and Summit Streets. It is planned to renew the track next summer.

**South Carolina Gas & Electric Company, Spartanburg, S. C.,** is repairing street paving between its tracks on East Main Street and Morgan Square. Tracks are being reconditioned and new copper bonds to hold the rail sections are being put in place. This work is preparatory to resumption of railway operation by the new management.

**Key System Transit Company, Oakland, Cal.,** has opened the new extension of the Piedmont electric train line into Piedmont, to serve that city and give through service to San Francisco. The extension into Piedmont runs from the old terminal at Piedmont Avenue and Fortieth Street over the present street car tracks to Manor station, and then over a new right-of-way and new tracks to Oakland Avenue. The extension cost $65,000. The Key System company has also begun work on t other projects in its program of tra replacement and extension. The fi was started on West Twelfth Street b tween Wood and Market Streets, Oa land. This involves the reconstructi of the tracks and the laying of perm nent pavements. The estimated cost $103,000. The second project cove double tracking of the Lakeshore Av nue line on Walla Vista Avenue fr the end of the present double tracka system at Lakeshore Avenue to a poi about 1,700 ft. beyond.

## *Trade Notes*

**Armin Elmendorf,** who during t war was in charge of the plywood se tion of the Forest Products laborato at Madison, Wis., has rejoined the eng neering staff of the Haskelite Manufa turing Corporation, Chicago, Ill. M Elmendorf has been in Europe for th past two years investigating the ele tric railway, bus and commercial bo fields. During his stay there he co lected a great deal of interesting da on car construction. Mr. Elmendo reports that the one-piece Haskeli roof has proved satisfactory on th street cars of London and that at th present time there are more than 2,00 buses on the streets of London usin Haskelite.

**T. R. Langan,** manager of the trans portation division of the Westinghous Electric & Manufacturing Company Buffalo, N. Y., will succeed A. Manson as manager of the transporta tion division of the New York office o the Westinghouse Electric & Manufa turing Company. As noted elsewher in this issue Mr. Manson has been mad manager of the heavy traction divisio of the company with offices in Pitts burgh.

**Howard J. Whittman, Toledo, Ohi** has been appointed district representa tive of the Kuhlman Electric Compan of Bay City, Mich. Mr. Whittman wi have northwestern Ohio as his territory

**Westinghouse Air Brake Company Wilmerding, Pa.,** automotive division has announced the opening of a new automotive air brake sales and servic branch at Detroit in the General Mo tors Building, with C. D. LeFevre i charge. Mr. LeFevre is well known i the automotive industry, having serve for several years as assistant secretar of the Society of Automotive Engineers A little more than two years ago h became Eastern manager of manufac turers' sales for the Westinghous Union Battery Company and was late made special factory representative He was graduated from Cornell as a mechanical engineer in 1911.

## *New Advertising Literature*

**J. G. Brill Company, Philadelphia Pa.,** has issued Bulletin No. 280, describing its 27-M. C. B. truck.

**Crouse-Hinds Company, Syracuse, N. Y.,** has issued folder No. 20, entitled Safety Switch Condulets (tumbler type).

# Accidents are often prevented by inches—

That is why a brake "just a little" better might pay for itself a thousand fold.

Inches often represent the dividing line between safety and a serious accident.

There is no time when a good brake is more essential to safety than in emergencies. Only a brake which is fast, powerful, and of ample capacity, can protect the lives of passengers. So much depends upon handbrakes that it pays to be over cautious in their selection.

Common sense dictates that any vehicle carrying large numbers of human beings should have the best brake equipment, which means the *safest*.

# Peacock Staffless Brakes Are Safe—

With a braking power three times that of the ordinary equipment, and almost unlimited chain winding capacity, Peacock Staffless Brakes are a guarantee of *safety*. Neither slack chain nor worn brake shoes can prevent effective braking, because there is no limit to the length of chain that can be wound in with the Peacock Staffless. Where the ordinary hand brake might jam after a few turns the Peacock will take up chain until the brakes take hold.





"The Peacock Staffless"

One serious accident prevented—perhaps by inches, will more than pay the entire cost of Peacock Brakes for your cars.

Ask us for estimate on your installation.

## National Brake Co., Inc.

**890 Ellicott Sq., Buffalo, N. Y.**

*Canadian Representative:*
**Lyman Tube & Supply Company, Limited, Montreal, Canada**

# Bankers and Engineers

## Ford, Bacon & Davis
Incorporated

**Engineers**

115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

## STONE & WEBSTER
Incorporated

EXAMINATIONS REPORTS APPRAISALS
ON
INDUSTRIAL AND PUBLIC SERVICE PROPERTIES

NEW YORK BOSTON CHICAGO

## SANDERSON & PORTER
**ENGINEERS**

REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS
RAILWAY, LIGHT and POWER PROPERTIES

CHICAGO NEW YORK SAN FRANCISCO

## ALBERT S. RICHEY
ELECTRIC RAILWAY ENGINEER
WORCESTER, MASSACHUSETTS
REPORTS - APPRAISALS - RATES - OPERATION - SERVICE

## STEVENS & WOOD, INC.
Design and Construction of Power Stations
Railroad Electrification, Industrial Plants
REPORTS AND APPRAISALS
*Management and Financing of Utilities and Industrials*

Mahoning Bank Bldg. Youngstown, O.
120 Broadway New York

## HEMPHILL & WELLS
CONSULTING ENGINEERS
Gardner F. Wells Albert W. Hemphill
*APPRAISALS*
INVESTIGATIONS COVERING
Reorganization Management Operation Construction
43 Cedar Street, New York City

## WALTER JACKSON
***Consultant on* Fares and Motor Buses**

**Originator of unlimited ride, transferable weekly pass. Campaigns handled to make it a success.**

**143 Crary Ave., Mt. Vernon, N. Y.**

## KELLY, COOKE & COMPANY
**Engineers**

149 BROADWAY NEW YORK
424 CHESTNUT STREET PHILADELPHIA

## The J. G. White Engineering Corporation
**Engineers—Constructors**

Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.

**43 Exchange Place** **New York**

## THE BEELER ORGANIZATION
ENGINEERS AND CONSULTANTS
**Traction-Traffic-Equipment-Power**
COORDINATION OF SERVICE—IMPROVED OPERATIONS
INCREASED TRAFFIC—FINANCIAL REPORTS
APPRAISALS—MANAGEMENT

**52 Vanderbilt Ave.** **New York City**

## ENGELHARDT W. HOLST
***Consulting Engineer***

**Appraisals, Reports, Rates, Service Investigation, Studies on Financial and Physical Rehabilitation Reorganization, Operation, Management**

**683 Atlantic Ave., Boston, Mass.**

## J. ROWLAND BIBBINS
*Engineer*—2301 Connecticut Ave., N. W. Washington, D. C.
TRANSPORTATION SURVEYS

**Organized Traffic Relief and Transit Development Co-ordinating Motor Transport, Railroad and City Plans, Service, Routing, Valuation, Economic Studies**

EXPERIENCE IN 20 CITIES

## JOE R. ONG
**Consulting Transportation Engineer**

***Specializing in Traffic Problems and in Methods to Improve Service and Increase Efficiency of Operation***

PIQUA, OHIO

## Dwight P. Robinson & Company
Incorporated
Design and Construction of
***Electric Railways, Shops, Power Stations***
**125 East 46th Street, New York**

Chicago Youngstown Atlanta Philadelphia
Los Angeles Montreal Rio de Janeiro

## DAY & ZIMMERMANN, INC.
ENGINEERS
DESIGN - CONSTRUCTION - REPORTS
VALUATIONS - MANAGEMENT

NEW YORK PHILADELPHIA CHICAGO

**The Most Successful Men in the Electric Railway Industry read the**

## ELECTRIC RAILWAY JOURNAL

**Every Week**

# AMERICAN BRIDGE COMPANY

EMPIRE BUILDING, 71 BROADWAY, NEW YORK

***Manufacturers of Steel Structures of all classes, particularly***

## BRIDGES AND BUILDINGS

*SALES OFFICES:*

*NEW YORK, N. Y. . Empire Bldg., 71 Broadway*
*Philadelphia, Pa., Widener Bldg., N. W. Cor. Chestnut and Juniper Sts.*
*Boston, Mass. . . . . 120 Franklin St.*
*Baltimore, Md., Continental Bldg., Cor. Calvert and Baltimore Sts.*
*PITTSBURGH, PA. . Frick Bldg., 440 Fifth Ave.*
*Cincinnati, Ohio . Union Trust Bldg., 36 East 4th St.*
*Cleveland, Ohio, Rockefeller Bldg., 614 Superior Ave., West*
*Detroit, Mich. . . Beecher Ave. and M. C. R. R.*
*CHICAGO, ILL. . . . . 208 South LaSalle St.*
*St. Louis, Mo., Liberty Central Trust Bldg., 506 Olive St.*
*Denver, Colo., First National Bank Bldg., 820 17th St.*
*Salt Lake City, Utah, Walker Bank Bldg., 175 S. Main St.*
*Duluth, Minn. . Wolvin Bldg., 229-31 West 1st St.*
*Minneapolis, Minn. . . 629 2nd St., S. E.*

*Pacific Coast Representative:*
*U. S. Steel Products Co., Pacific Coast Dept.*

*San Francisco, Cal., Rialto Bldg., 116 New Montgomery St.*
*Portland, Ore. . Selling Bldg., 322 Adler St.*
*Seattle, Wash. . 4th Ave., So., Cor. Conn. St.*

*Export Representative: United States Steel Products Co., 30 Church St., N. Y.*

The Most Successful Men in the Electric Railway Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

C. B. BUCHANAN, President — W. H. PRICE, JR., Sec'y-Treas. — JOHN F. LAYNG, Vice-President

BUCHANAN & LAYNG CORPORATION

*Engineering and Management, Construction, Financial Reports, Traffic Surveys and Equipment Maintenance*

BALTIMORE, 825 Equitable Bldg. — Phone: Hanover 2142 — NEW YORK, 49 Wall Street

JAMES E. ALLISON & CO.

Consulting Engineers

Specializing in Utility Rate Cases and Reports to Bankers and Investors

1017 Olive St., St. Louis, Mo.

Transmission Line and Special Crossing Structures, Catenary Bridges

WRITE FOR OUR NEW DESCRIPTIVE CATALOG

ARCHBOLD-BRADY CO.

Engineers and Contractors — SYRACUSE, N Y

Bureau of Commercial Economics, Inc.

*Industrial Engineers*

Organization · Methods · Layout and Facilities
Public and Industrial Relations

72 West Adams Street · CHICAGO

THE P. EDWARD WISH SERVICE

50 Church St. NEW YORK — *Street Railway Inspection* DETECTIVES — 131 State St. BOSTON

HUMAN ENGINEERING

*Railway Audit and Inspection Company, Inc.*

*Fourth and Chestnut Sts., Philadelphia*

Boston, New Orleans, New York, Pittsburgh — BRANCHES — Baltimore, Chicago, Atlanta, St. Louis

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

# Easiest Maintenance



VITRIFIED brick, asphalt-filled, protects ties, cross-rods and base from seepage and destructive action of surface drainage, yet the tight water-seal is easily broken by a crow-bar when repairs are required. Each brick is then a removable unit, ready for relaying,—salvage value is practically 100%.

**Six-point-service—**

I
absorbs impacts at rail joints

II
water-seals road-bed and ties

III
allows for contraction and expansion

IV
resists heaviest traffic

V
is easily removable for track repairs

VI
practically 100% salvage value

VITRIFIED **Brick** PAVEMENTS

*Get six-point-service and six-point-satisfaction,—pave with vitrified brick, asphalt-filled.*

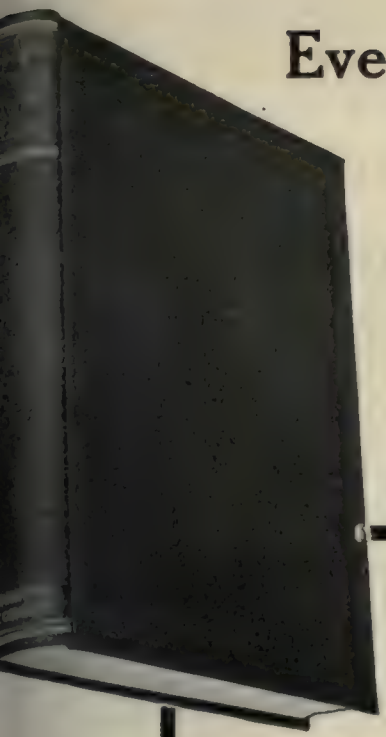


**OUTLAST THE BONDS**

NATIONAL PAVING BRICK MANUFACTURERS ASSOCIATION, ENGINEERS BLDG., CLEVELAND, OHIO



Alton Brick Company
Alton, Ill.
Binghamton Brick Company
Binghamton, N. Y.
Cleveland Brick & Clay Company
Cleveland, Ohio
Clydesdale Brick & Stone Co.
Pittsburgh, Pa.
Coffeyville Vitrified Brick & Tile Co.
Coffeyville, Kans.
Collinwood Shale Brick Company
Cleveland, Ohio
Francis Vitric Brick Company
Boynton, Okla.
Georgia Vitrified Brick & Clay Co.
Augusta, Ga.
Globe Brick Company
East Liverpool, Ohio
Hisylvania Coal Co.
Columbus, Ohio
Hocking Valley Brick Company
Columbus, Ohio
Independence Paving Brick Co.
Independence, Kans.
Metropolis Paving Brick Co.
Pittsburg, Kans.
Metropolitan Paving Brick Co.
Canton, Ohio
Mineral Wells Paving Brick Co.
Mineral Wells, Texas
Moberly Paving Brick Company
Moberly, Mo.
Murphysboro Paving Brick Co.
Murphysboro, Ill.
Nelsonville Brick Co.
Nelsonville, Ohio
Peebles Paving Brick Company
Portsmouth, Ohio
Purington Paving Brick Company
Galesburg, Ill.
Southern Clay Mfg. Company
Chattanooga, Tenn.
Springfield Paving Brick Company
Springfield, Ill.
Sterling Brick Company
Olean, N. Y.
Streator Clay Mfg. Company
Streator, Ill.
Thornton Fire Brick Co.
Clarksburg, W. Va.
Thurber Brick Company
Ft. Worth, Texas
Toronto Fire Clay Company
Toronto, Ohio
Trinidad Brick & Tile Company
Trinidad, Colo.
Veedersburg Paver Company
Veedersburg, Ind.
Western Shale Products Company
Fort Scott, Kans.
Westport Paving Brick Company
Baltimore, Md.



# Every electric railway man will want this new revised edition of

## Blake and Jackson's

# Electric Railway Transportation

***Just Off the Press***

By HENRY W. BLAKE
Editor, Electric Railway Journal

AND WALTER JACKSON
Formerly Associate Editor
Electric Railway Journal

*Second Edition*

**437 pages, 6x9, 121 illustrations, $5.00 net, postpaid**

### Your name in gold free

Until January 1, 1925 we will stamp your name, or a friend's name, in gold on the front cover of this valuable transportation book. It is a book that will help you constantly in the problems you have to face every day—it is a book well worth making one's own. Remittances should accompany orders for stamped copies and, of course, books already made yours by stamping, are not returnable.

***Free Holiday Stamping Offer***

### Modern electric railway transportation

This new second edition of Electric Railway Transportation, covers every important phase of modern electric railway transportation, giving all of the latest developments and all of the latest methods used to meet present-day traffic requirements and competitive activities.

The book gives the most valuable kind of information on getting the cars over the line—handling traffic difficulties—making and maintaining schedules—collecting fares—securing the proper public relations—using the motor bus as a supplementary service—meeting outside bus competition—trackless trolleys—keeping the working force efficient—and hundreds of other important electric railway points.

### The latest developments in successful practice

This second edition is practically a new book. The material has been thoroughly revised and brought right down to present-day practice. Much new valuable material has been added. Of particular value is the new information given on

(1) the motor bus in the modern transportation scheme, showing how the bus is being utilized in supplementing railway service—and pointing out how bus competition is being successfully met by transportation companies;

(2) the emphasis placed upon merchandising in securing for a road the maximum traffic. Rapid strides have been made in recent years in this direction and the full importance of this phase of transportation work is reflected in the pages of this book.

### CHAPTER HEADINGS

I.—Organization and Definitions. II—Adjustment of Traffic to Service. III.—Accelerating Traffic Movement Along the Line. IV.—Accelerating Traffic Movement on the Car. V—Car Types in Relation to Traffic. VI.—City Timetables—Preliminaries. VII—Interurban Schedules and Dispatching. VIII—Fares. IX.—Fare Collection Practices and Devices. X.—Public Relations. XI.—Promotion of Passenger Traffic. XII.—Traffic Signs for Cars, Station and Road. XIII.—Motor-Bus Operation by Electric Railways. XIV.—Selection and Training of Men. XV.—Wages and Wage Agreements. XVI.—Employee Relations. XVII.—Discipline of Trainmen. XVIII—Forms of Extra Pay.

### Order a stamped copy— or examine it for 10 days free

You can get a copy stamped with your name or a friend's name. Or, if you would like to examine the book, we will glady send you a copy for ten days' free inspection. Check A or B on the coupon and mail it today.

## McGRAW-HILL BOOK CO., Inc.

*Publishers of books for Electric Railway Journal*

**370 Seventh Ave., New York**

### *Special Holiday Coupon*

**McGraw-Hill Book Company, Inc.**
**370 Seventh Avenue, N. Y.**

☐ A. Send me Blake and Jackson's ELECTRIC RAILWAY TRANSPORTATION with name stamped in gold on the front cover. I enclose proper remittance and understand that stamped copies are not returnable.

.....
*(Name to be stamped)*

☐ B. Send me for ten days' free examination Blake and Jackson's ELECTRIC RAILWAY TRANSPORTATION, $5.00 net, postpaid. I agree to remit for the book or to return it, postpaid, within ten days of receipt.

Name .....

Address .....

City and State .....

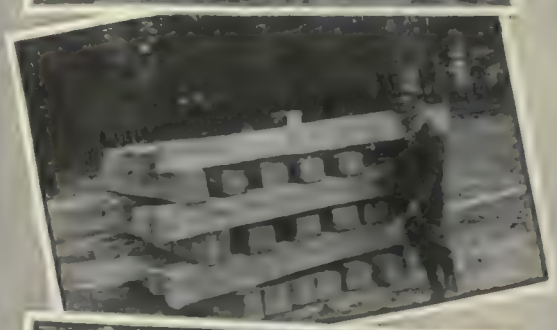
Position .....

Company .....

Books sent on approval to retail purchasers in U. S. and Canada only.

E. 11-22-24









# International

## Creosoted Ties for Electric Traction Use

THE United States Forest Service co-operating with the American Wood Preservers' Association has just published its latest statistics on wood treated in the United States. The record goes back fifteen years and shows 500 million wooden ties treated from 1909 to 1924.

Where *untreated* ties on big railroads once lasted from seven to ten years and then failed from decay, *treated* ties now last over twenty years and even then do not fail from decay. They *wear out* under the pounding of heavy locomotives and high speed trains. The decay problem has been answered by timber preservation. Only the problem of mechanical wear remains.

The electrical railway is not seriously troubled with this problem of mechanical wear. That's the reason for the long life of treated wooden ties on the electric system. That's why ***International*** creosoted ties in the New Orleans and Carrollton R.R. L. & P. Company tracks, after twenty-five years of service, are still in use.

*Quality ties and unexcelled service are available through International. You will profit by investigating.*

**International Creosoting & Construction Co.**

General Office Galveston, Texas

Plants: Texarkana, Texas; Beaumont, Texas
Galveston, Texas

# SPAIN *Says:*

T. S. Q. means this ➘

de la Concepción y algunas en la Ciudad Lineal.

*Material móvil.*—Muy importante, tanto como necesaria, ha sido la renovación de piezas, mereciendo especial mención el importante suministro hecho por los Talleres de Deusto de piezas para los trucks; los engranes, piñones de acero especial de la más acreditada marca en el mundo, «Tool steel»; un hogar de cobre de la casa alemana Orenstein y

***Translation*** "Very important and necessary has been the purchase of repair parts and we make special reference to the gears and pinions of the most famous make in the world, the "Tool Steel."

A large company in Spain, in its annual report to stockholders, commenting on its financial showing and *good management*, includes the above paragraph.

"Tool Steel" Quality T. S. Q. "Tool Steel" Quality

**Tool Steel Gear and Pinion Co.**
Cincinnati, Ohio



Partially cut-away view showing the entire driving mechanism of the Huck Axle, which is a self-contained unit.



The drive of the Huck Axle is balanced.

# *An improvement*
## over conventional second reduction gearing



The first reduction is a spiral bevel gear set in which the bevel pinion is almost as large as the bevel gear.



The second reduction is accomplished by epicyclic gearing, which is noted for its extremely high efficiency.

BY centralizing the entire driving mechanism of the Huck Double Reduction Axle in a self-contained unit, it is possible to operate it in a bath of oil.

Because the entire driving mechanism is a self-contained unit, housing deflection and play in the wheel bearings [which have been minimized in the Huck Axle but can never be totally eliminated in any type or kind of axle] do not affect the alignment of gears and parts having motion relative to each other and are therefore rendered harmless.

The perfect lubrication and positive alignment resulting from the unit construction of the driving mechanism spell LONG LIFE AND PERMANENTLY QUIET OPERATION.

The gearing used has rolling contact rather than sliding contact. This *reduces frictional power loss to a negligible amount* under any load and speed condition.

The driving mechanism is extremely accessible and its compactness provides ample road and overhead clearance thus allowing lower bus floors.

*And it does so without a large overhang* ahead of the axle, which is undesirable because of the great length of the arc through which it snaps the rear universal joint when the axle weaves as the springs absorb and cushion the torsional reaction.



The internal gear teeth form the fulcrum of the continuous levers which the driving pinions form. The force on the pins driving the axle shafts is double the tooth pressure.



This book tells a more complete story. Send for it.

**SHELDON AXLE & SPRING CO.**
*Huck Axle Division* — *Wilkes-Barre, Pa.*

**HUCK DOUBLE REDUCTION BUS AXLE**

*Made by Sheldon* — *under Huck Patents*



0320-7

# WHEN RAILWAY MEN

in general, study the question of *wood durability* for other purposes, as carefully as *Railway Signal* men have studied it for *Trunking* and *Capping*, there will be a lot more

## "ALL-HEART" "TIDEWATER" CYPRESS "THE WOOD ETERNAL"

used for *Fencing, Ties, Car Material, Station Construction* and similar railroad requirements, *to the very great economy of the companies using it.*

The long service which "*All-Heart*" *Tidewater Cypress* gives,

SAVES LABOR COSTS FOR RENEWALS AND REPLACEMENTS

—big items in themselves.

"*All-Heart*" *Tidewater Cypress comes nearer being decay proof than any other wood.*

This mark on every timber, board and bundle of *Tidewater* Cypress is your *insurance of true replacement economy.*

The data in support of these facts will be promptly furnished upon request.

**SOUTHERN CYPRESS MFRS.' ASSN**

1265 Poydras Building, New Orleans La., or
1265 Graham Building, Jacksonville, Fla. 68



## *Ama Ganda*

Among the Kaffirs it is not thought wise for a woman to eat too many eggs (ama ganda).

For they consider eggs a semi-mystery.

And even in this country eggs are regarded as a semi-mystery.

Carbon brushes too.

*In a great many instances* we never know the content of either until we get on the inside.

*In a very few instances* we do know—one being Morganite—in which you get good ingredients—uniformly.

Another thing the brush has in common with the egg:—*parts* of it can't be good.

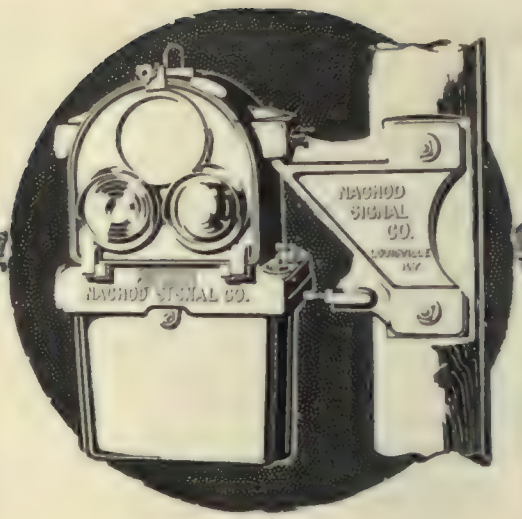
It's either all good or—

**Morganite Brush Co., Inc.**

*Main Office and Factory*
*519 West 38th St., New York*

DISTRICT ENGINEERS AND AGENTS:

*Pittsburgh*, Electrical Engineering & Mfg. Co., 909 Penn Ave.
*Cincinnati*, Electrical Engineering & Mfg. Co., 607 Mercantile Library Building.
*Cleveland*, Electrical Engineering & Mfg. Co., 422 Union Building.
*Philadelphia*, Electric Power Equipment Corp., 412 North 18th St.
*Baltimore*, O. T. Hall, Sales Engineer, 1926 Edmondson Ave.
*Revere, Mass.*, J. F. Drummey, 75 Pleasant Street.
*Los Angeles*, Special Service Sales Co., 502 Delta Building.
*San Francisco*, Special Service Sales Co., 202 Russ Building.
*Toronto, Can.*, Railway & Power Engineering Corp., Ltd., 131 Eastern Ave.
*Montreal, Can.*, Railway & Power Engineering Corp., Ltd., 326 Craig St., West.
*Winnipeg, Can.*, Railway & Power Engineering Corp., Ltd., P. O. Box No. 35.




## Keep Your Cars Moving

The manager speaks: "The main thing about operating street cars, and especially on single track lines, is to keep the cars moving and not have them waste a lot of time on switches waiting for meets. This, more than anything else, exasperates and drives away passengers."

*Verily, the car on the switch gathers no dividends.*

Nachod Signals are invaluable with

## Safety Cars

to maintain the short headways that invite the public to ride. Nachod Signals tell the motorman when the block is clear to the next passing siding. Show him when he takes the block that he has stopped an opposing movement. Permit other cars to follow him thru the block, notifying them that the block is occupied and giving each an indication of protection in entering; meanwhile holding stop signals at the other end until the block is again clear.

## NACHOD SIGNALS

protect all shifting moves automatically, permitting city and interurban cars to change order at a siding.

*They save time by eliminating a stop, since they work at any speed. They operate from overhead contactors at any feasible line voltage and give duplicate indications of lights and disks that cannot be mistaken under any lighting conditions.*

Catalog 719 describes Nachod Signals. Write for it.

Nachod Signal Co., Inc., Louisville, Ky.
Manufacturers of Automatic Signals, Highway Crossing Bells and Automatic Headway Recorders.

NACHOD SPELLS SAFETY






## *Is a noisless, vibrationless gear possible?*



Nuttall Helical Gear and Pinion

You have had visions of a gear — a quiet, smooth acting gear that would work without constantly jarring loose nuts, bearings, insulation and generally shortening the life of the motor and even the car itself.

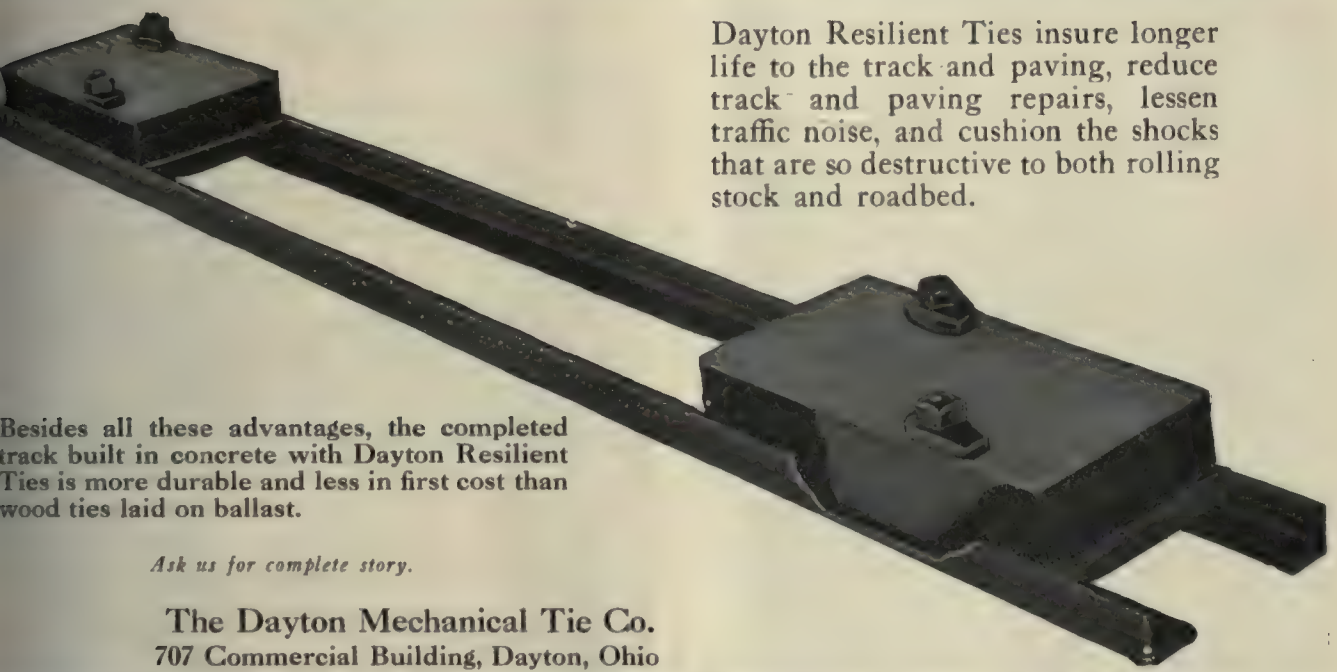
This ideal has been realized in the Nuttall Helical Gear. This gear is virtually noiseless. It has been proven to be the smoothest, quietest and most enduringtype of gear that can possibly be made.

If you really want noiseless cars and less maintenance work, investigate Nuttall Helical Gears. Our Gear book tells you all about them. Write for it.

R.D.NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

# DAYTON Resilient TIE



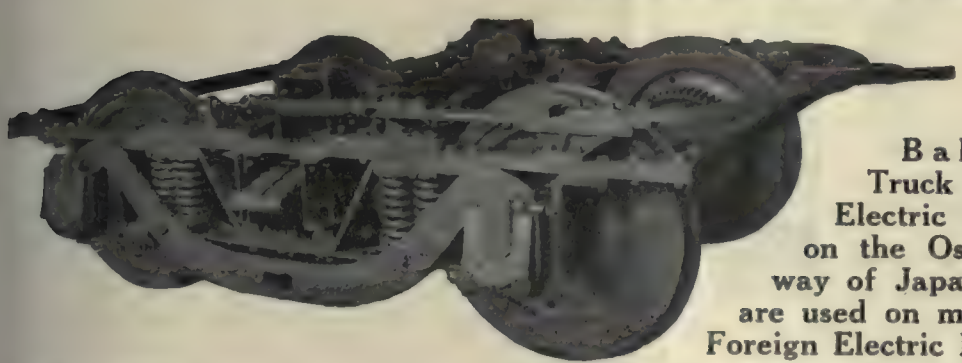
Dayton Resilient Ties insure longer life to the track and paving, reduce track and paving repairs, lessen traffic noise, and cushion the shocks that are so destructive to both rolling stock and roadbed.

**Besides all these advantages, the completed track built in concrete with Dayton Resilient Ties is more durable and less in first cost than wood ties laid on ballast.**

*Ask us for complete story.*

The Dayton Mechanical Tie Co.
707 Commercial Building, Dayton, Ohio

# Baldwin Electric Motor Trucks Meet Every Requirement



**Baldwin Type "A" Truck used on the Osaka Electric Railway and also on the Osaka Tetsudo Railway of Japan. Similar Trucks are used on many American and Foreign Electric Railways.**

JAPANESE electric railways for a number of years have used Baldwin Types "A" and "AA" Electric Motor Trucks with the most satisfactory results. The center pin load of Type "A" Trucks is from 25,000 to 30,000 pounds, and Type "AA," 30,000 pounds and upwards.

Baldwin Electric Motor and Trailer Trucks are built with the same care as are locomotives which bear the name Baldwin.

*Our nearest representative will furnish complete information relative to all types of trucks we build and our facilities for making early deliveries.*

## THE BALDWIN LOCOMOTIVE WORKS

**PHILADELPHIA, U. S. A.** **Cable Address, "Baldwin, Philadelphia"**

AMERICAN ELECTRICAL WORKS
AMELECTRIC
Wires and Cables
PHILLIPSDALE, R.I.

Reg. U. S. Pat. Office

Incandescent Lamp Cord

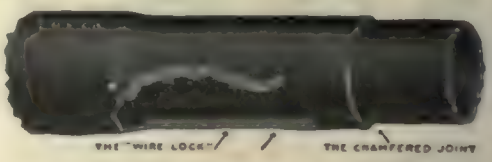
## AMELECTRIC PRODUCTS

BARE COPPER WIRE AND CABLE
TROLLEY WIRE
WEATHERPROOF WIRE AND CABLE
PAPER INSULATED UNDERGROUND CABLE
MAGNET WIRE

**AMERICAN ELECTRICAL WORKS**
PHILLIPSDALE, R. I.

Boston, 176 Federal; Chicago, 112 W. Adams;
Cincinnati, Traction Bldg.; New York, 100 E. 42nd St.

## ELRECO TUBULAR POLES




COMBINE

Lowest Cost — Lightest Weigh
Least Maintenance — Greatest Adaptabilit

Catalog complete with engineering data sent on request.

**ELECTRIC RAILWAY EQUIPMENT CO.**
CINCINNATI, OHIO
New York City, 30 Church Street

## J-P Products of interest to Electric Railways

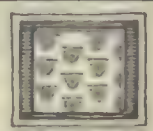

NOARK Fuses


NOARK Fuse Clips CUTOUT BASES


NOARK Service and Underground Boxes


Railway and Mine hangers and insulators


J-P Molding Service (Covered Basin)


VULCABESTON Sheet and Rope Packing

**JOHNS-PRATT CO. HARTFORD, CONN.**

## ANACONDA TROLLEY WIRE

ANACONDA COPPER MINING COMPANY
Conway Building, Chicago, Ill.

THE AMERICAN BRASS COMPANY
General Offices, Waterbury, Conn.

## PEIRCE
### Railway Feeder Pins



A strong Forged Steel Pin designed for heavy duty. Their low cost permits their use over the entire system.



**HUBBARD & COMPANY**
PITTSBURGH — CHICAGO

TRADE.
*For dependable Line Material that will give you maximum service use*
# ANDERSON
MARK
*Send for Latest Quotations*
Main Office and Factory, Boston, Mass.




**WELDING CABLE**
**ELECTRICAL WIRES and CABLES**
John A. Roebling's Sons Company, Trenton, N. J.

## Chapman
## Automatic Signals
**Charles N. Wood Co., Boston**



## Shaw Lightning Arresters
*Standard in the Electric Industries for 35 years*
**Henry M. Shaw**
*150 Coit St., Irvington, Newark, N. J.*



## Standard Underground Cable Co.
Manufacturers of
Electric Wires and Cables of all kinds;
also Cable Terminals, Junction Boxes, etc.
Boston Philadelphia Pittsburgh Detroit New York
San Francisco Chicago Washington St. Louis



Trade Mark

**Advertisements for the**
## Searchlight Section



Can be received at the New York Office of Electric Railway Journal until 10 a. m.

## Wednesday

For issue out Saturday

# American Rail Bonds

CROWN
UNITED STATES
TWIN TERMINAL
SOLDER
TRIPLEX

Arc Weld and Flame Weld

*Send for new Rail Bond Book*

**American Steel & Wire Company**
CHICAGO
NEW YORK

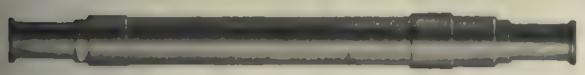
# KERITE



KERITE INSULATED WIRE & CABLE COMPANY
NEW YORK CHICAGO

Cambria Forged Steel Electric Car Axles

*To Meet Most Rigid Specifications*



Other products for the electrical field includes wheels, armature shafts, rails, spikes, track work, splice bars, bolts, tie plates, tie rods, pole line material, sheets, magnet steel and gear blanks.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

# BETHLEHEM

# High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS
COMPLETE LAYOUTS
IMPROVED ANTI-KICK BIG-HEEL SWITCHES
HARD CENTER AND MANGANESE CONSTRUCTION

New York Switch & Crossing Co.
Hoboken, N. J.

SPECIALISTS
in the
Design and Manufacture
of
*Standard—Insulated—and Compromise Rail Joints*

The Rail Joint Company
61 Broadway, New York City

# Lorain Special Trackwork Girder Rails

*Electrically Welded Joints*

THE LORAIN STEEL COMPANY
Johnstown, Pa.

*Sales Offices:*
Atlanta Chicago Cleveland New York
Philadelphia Pittsburgh

*Pacific Coast Representative:*
United States Steel Products Company
Los Angeles Portland San Francisco Seattle

*Export Representative:*
United States Steel Products Company, New York, N. Y.

# THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

**Builders since 1868 of Water Tube Boilers of continuing reliability**

BRANCH OFFICES

BOSTON, 49 Federal Street
PHILADELPHIA, Packard Building
PITTSBURGH, Farmers Deposit Bank Building
CLEVELAND, Guardian Building
CHICAGO, Marquette Building
CINCINNATI, Traction Building
ATLANTA, Candler Building
PHOENIX, ARIZ., Heard Building
DALLAS, TEX., 2001 Magnolia Building
HONOLULU, H. T., Castle & Cooke Building
PORTLAND, ORE., 305 Gasco Building

THE BABCOCK & WILCOX COMPANY — STEAM

WORKS

Bayonne, N. J.
Barberton, Ohio

**Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893**

BRANCH OFFICES

DETROIT, Ford Building
NEW ORLEANS, 521-5 Baronne Street
HOUSTON, TEXAS, Southern Pacific Building
DENVER, 435 Seventeenth Street
SALT LAKE CITY, 405-6 Kearns Building
SAN FRANCISCO, Sheldon Building
LOS ANGELES, 404-6 Central Building
SEATTLE, L. C. Smith Building
HAVANA, CUBA, Calle de Aguiar 104
SAN JUAN, PORTO RICO, Royal Bank Building

# BUDA

ESTABLISHED 1881

Special Track Work of every description

**THE BUDA COMPANY**

Harvey (Suburb Chicago) Illinois

# "CARNEGIE"

*for*

WHEELS
AXLES
RAILS
CROSS TIES



**Carnegie Steel Company**
PITTSBURGH, PENNA.

# ALLIS-CHALMERS

MILWAUKEE, WIS. U.S.A.

**Electrical Machinery, Steam Turbines, Steam Engines, Condensers, Gas and Oil Engines, Air Compressors, Air Brakes**

BRAZED **Rail Bonds** ARC WEL

**Portable Arc Welding Outfits**

**The Electric Railway Improvement C**

Cleveland, Ohio

FERALITE

## ALUMINO-THERMIC JOINTS

New and independent process. No inserts needed. Up-to-date and economical.

**Alumino-Thermic Corp., Roselle Park, N. J.**

## RAMAPO AJAX CORPORATION

Ramapo Automatic Return Switch Stands for Passing Sidings

RACOR

RACOR Tee Rail
Special Wor
Manganese
Constructio

GENERAL OFFICES: HILBURN, NEW YORK

Chicago New York Superior, Wis. Niagara Falls, M.
Canadian Ramapo Iron Works, Ltd., Niagara Falls, Ont.

## A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

**Cameron Electrical Mfg. Co., Ansonia, Connecticut**

## NEW and RELAYING RAILS

1 TON OR 1000

TRACK EQUIPMENT

L·B·FOSTER CO.

PITTSBURGH - PENNSYLVANIA

RAIL ACCES ORIES

NEW YORK - JERSEY CITY - PHILADELPHIA - HAMILTON,

## ECONOMIZERS

reduce fuel costs by making use of waste exhaust gases to preheat the boiler feed. Patented construction proven by 20 years of service.

# FOSTER

## SUPERHEATER

improve engine, turbine a boiler economy by enabling given amount of steam to more work. Over 10,000 stallations in stationary pow plants.

**POWER SPECIALTY CO.,** Boston, Phila., Pitts., Detroit, Kans. City, Chicago, San Fran., Los Angeles, Boulder, Dallas, London **111 Broadway, NEW YORK**

## We are prepared

to handle any high grade proposition where

**VARNISHED CAMBRIC**
**Wires and Cables**

are required.

When using *quality* Wires and Cables use *quality* Tapes.

"MANSON" Tape, "OKONITE" Tape, "DUNDEE" Tapes.

**THE OKONITE CO., Passaic, N. J.**
Incorporated 1884

OKONITE
TRADE MARK.

*Sales Offices: New York—Atlanta—Pittsburgh—San Francisco.*
*Agents:* Central Electric Co., Chicago, Ill. Pettingell-Andrews Co., Boston, Mass.; The F. D. Lawrence Electric Co., Cincinnati, Ohio; Novelty Electric Co., Philadelphia, Pa.
*Canadian Representatives:* Engineering Materials Limited, Montreal.

TULC
LUBRICANT

We make a specialty of

**ELECTRIC RAILWAY LUBRICATION**

We solicit a test of TULC on your equipment

**The Universal Lubricating Co.**
Cleveland, Ohio
Tulc, Inc., Eastern Representative,
1617 Gotham National Bank Bldg., New York City

THE WORLD'S STANDARD

## "IRVINGTON"

Black and Yellow
Varnished Silk, Varnished Cambric, Varnished Paper

Irr-O-Slot Insulation Flexible Varnished Tubing
Insulating Varnishes and Compounds

**Irvington Varnish & Insulator Co.**
Irvington, N. J.

*Sales Representatives in the Principal Cities*

B. A. HEGEMAN, Jr., President — C. C. CASTLE, First Vice-President
H. A. HEGEMAN, Vice-Pres. and Treas. — F. T. SARGENT, Secretary
W. C. PETERS, Manager Sales and Engineering

## National Railway Appliance Co.

Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., New York
Munsey Bldg., Washington, D. C. — 100 Boylston St., Boston, Mass.
Hegeman-Castle Corporation, Railway Exchange Building, Chicago.

**RAILWAY SUPPLIES**

- Tool Steel Gears and Pinions
- Bell Locked Fare Box and Change Maker
- The Aluminum Field Coils
- Truck and Car Repair Parts
- Cutler-Hammer Electric Heaters
- Pittsburgh Forge & Iron Co.'s Products
- Genesco Paint Oils
- E. Z. Car Control Corporation's Safety Devices
- Garland Ventilators
- Flaxlinum Insulation
- Yellow Coach Mfg. Co.'s Single and Double Deck Busses
- Economy Electric Devices Co.'s Power Saving and Inspection Meters
- Anglo-American Varnish Co., Varnishes, Enamels, etc.
- Gilmer Multiple Safety Step Treads
- National Hand Holds
- Ft. Pitt Spring & Mfg. Co., Springs
- Turnstile Car Corporation's Turnstiles
- Anderson Slack Adjusters
- Feasible Drop Brake Staffs
- Dunham Hopper Door Device

N-L

## The oftener they ride—

The oftener they ride, the more money you make. The more comfort you give them, the more trips you'll carry them. Close all windows tightly against snow, sleet and rain. Keep the car free of all stuffy atmosphere, engine fumes, excess heat and tobacco smoke. *Maintain fresh air without the slightest draft.* Keep *every* passenger comfortable, by using N-L's for ventilation, and sell more rides.



N-L Type "AA"
Bus Ventilator

**The Nichols-Lintern Company**
7960 Lorain Ave. — Cleveland, Ohio
Canadian Rep.: Railway & Power Eng. Corp., Ltd., 133 Eastern Ave., Toronto, Ont.

STOP

## "OSKELITE"

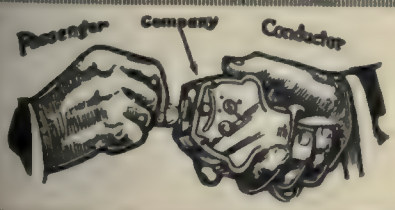
The Stop Light for street cars. Operates from brake system. Details on request.

**The Oskel Equipment Co.**
940 McCormick Bldg., Chicago, Ill.

PANELYTE

**HEADLININGS**

THE PANELYTE COMPANY, Trenton, N. J.




**Direct Automatic Registration By the Passengers**

Rooke Automatic Register Co.
Providence, R. I.

PS HEATERS

## Car Heating and Ventilation

are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

**The Peter Smith Heater Company**
6209 Hamilton Ave., Detroit, Mich.




Type R-11
Double Register

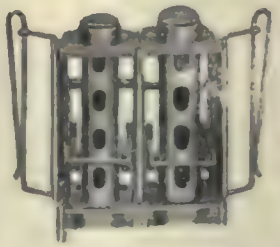
## International Registers

Made in single and double types to meet requirements of service. For hand or foot, mechanical or electric operation. Counters, car fittings, conductors' punches.

Exclusive selling agents for HEEREN ENAMEL BADGES.

**The International Register Co.**
15 South Throop Street, Chicago, Illinois

# JOHNSON Universal Changer



### Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

### Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

**JOHNSON FARE BOX COMPANY**
Ravenswood, Chicago, Ill.



The Zone System of Fares is Successfully Collected with the Aid of

## CLEVELAND FARE BOXES

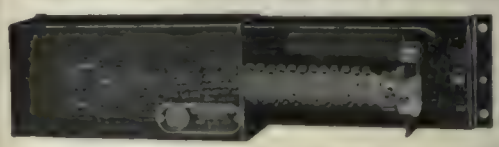
*Let Us Give You Particulars*

**The Cleveland Fare Box Co.**
Cleveland, Ohio

Canadian Cleveland Fare Box Co., Ltd.,
Preston, Ont.

Coin Counting and Sorting Machines. Change Carriers

THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



**No. 478E**

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.

## Heywood-Wakefield CAR SEATS

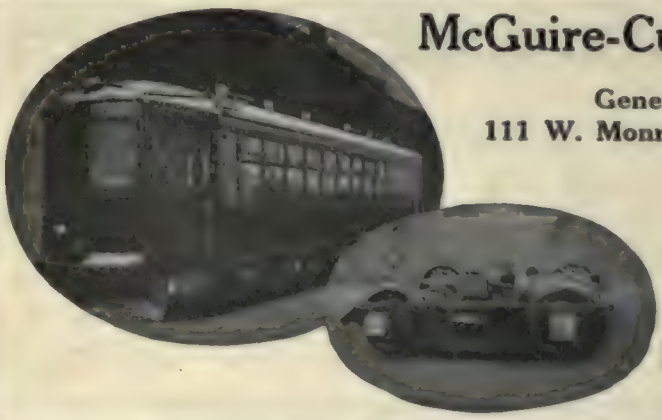
of pressed Steel for all Classes of Passenger Service. Rattan for covering seats and for snow sweepers.

HEYWOOD-WAKEFIELD CO.
Factory at Wakefield, Mass.
Offices at New York, Chicago, San Francisco

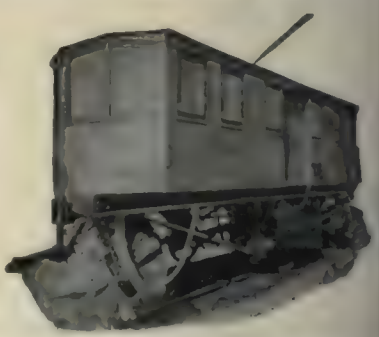
for detailed description see CAR BUILDERS CYCLOPEDIA Latest Edition

## McGuire-Cummings Manufacturing Co.

General Offices:
111 W. Monroe St., Chicago, Ill.



Street Cars
Trucks
Snow Sweepers





*Gets Every Fare*
PEREY TURNSTILES or PASSIMETERS

Use them in your Prepayment Areas and Street Cars

Perey Manufacturing Co., Inc.
101 Park Avenue, New York City

## HASKELITE

Moulded roofs are furnished in sections best suited to the car builder. They increase the strength, reduce weight and labor costs of your cars.

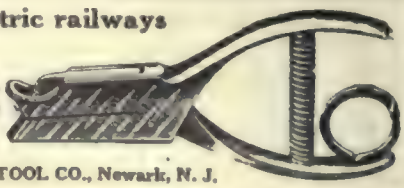
Plymetl girder panels armour the sides against blows. They weigh less than 16 gauge steel, reduce vibration and rumbling.

Send for blueprint booklet.

HASKELITE MANUFACTURING CORPORATION
133 W. Washington Street, Chicago, Ill.

75% of the electric railways use

## B-V Punches



*Send for Catalog*

BONNEY-VEHSLAGE TOOL CO., Newark, N. J.

## HALE-KILBURN CAR SEATS

*For Every Class of Service*

General Offices and Works: Philadelphia
Offices: New York, Chicago, St. Louis, Washington, San Francisco

# SEARCHLIGHT SECTION

## USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD.

*Positions Wanted*, 4 cents a word, minimum 75 cents an insertion, payable in advance.

*Positions Vacant* and all other classifications, 5 cents a word, minimum charge $2.00.

*Proposals*, 40 cents a line an insertion.

INFORMATION:

*Box Numbers* in care of any of our offices count 10 words additional in undisplayed ads.

*Discount* of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH

1 to 3 inches.....$4.50 an inch
4 to 7 inches..... 4.30 an inch
8 to 14 inches..... 4.10 an inch

Rates for larger spaces, or yearly rates, on request.

*An advertising inch* is measured vertically on one column, 3 columns—30 inches—to a page.

E.F.J.

### POSITION VACANT

DESIGNERS and draftsmen with electric railway power experience wanted for work in the East. Applicants will please state age, experience in detail, salary expected and when they will be available for employment. P-754, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

ELECTRIC tramway superintendent wanted for West Indies. Excellent living conditions, delightful climate, good pay. Position suitable for young man with professional training and practical experience. P-751, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

SHOP foreman wanted for electric railway in New England. Give experience, reference, age and salary expected in first letter. P-752, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

### POSITIONS WANTED

AUDITOR or assistant. Twenty years' experience in electric light, power and railways. At present employed but desire to make change. PW-750, Elec. Ry. Journal, Leader-News Bldg., Cleveland, Ohio.

EXECUTIVE. Urban and interurban. Wide successful experience in all departments of construction and operation. PW-740, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

MECHANICAL and electrical engineer, thoroughly experienced with rolling stock design, construction and maintenance, desires connection with some city or interurban electric railway. Particularly qualified as superintendent of rolling stock and equipment on any size property. PW-755, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

TRANSPORTATION superintendent, 3½ years' experience. Proven ability in public relations. 2½ years' experience track department. 38 years of age, married. Can furnish best of references. Willing to locate anywhere. PW-753, Elec. Ry. Journal, Leader-News Bldg., Cleveland, Ohio.

## WANTED MANAGER

To take charge and operate Railway Department, 125 miles of city and interurban track. 300 street cars. Reply, giving full particulars, to

**Winnipeg Electric Co.**
Winnipeg, Canada
A. W. McLimont, Vice President

## FOR SALE Standard Gauge Electric Railway Equipment

1—Parlor Chair Car, built by American Car Company, length 48-ft.—seating capacity 40—fully equipped air brakes, electric heating system. Brill standard double trucks, 65-hp. motors. Type M Controller.

6—Interurban Passenger Cars, built by American Car Company, length of cars 49-ft., seating capacity 50, fully equipped air brakes. Electrical equipment 4 G.E.—67—40-hp. motors and K-6 controllers. Smith heaters and Brill standard double trucks.

1—Express Car built by American Car Company, length 50-ft., equipped with air brakes, stove heat. Brill standard double trucks. Electrical equipment 4 G.E.—67—40-hp. motor and K-28 controller.

1—Line Car, 24-ft. long. Electrical equipment consists of 2 G.E.—1000—35-hp. motors and K-10 controller.

Cars in splendid condition, finished in both rattan and plush. For quick sale, we offer these Cars at $3000 each, f.o.b. cars. Write at once for detailed specifications. Located in Chicago District. Inspection invited.

**HYMAN-MICHAELS COMPANY**
*Rails, Locomotives and Cars*
Main Office—CHICAGO—Peoples Gas Bldg.
District Offices: New York, Pittsburgh, St. Louis, San Francisco

FOR SALE

## STEEL BRIDGE

Through double track truss. Angle of skew—30 degrees to the left. Span—107 ft. c. to c. of bearings. Width—28 ft. c. to c. of trusses. Capacity—80-ton cars, 6-ft. wheel base and 22 ft. c. to c. Estimated weight of steel—173,228 lbs.

Bridge located at Frankfort Junction, over Erie Canal on West Shore Cut-Off.

**New York State Railways**
Rochester, N. Y.




FOR SALE

## MOTORS

18—G.E. 264; practically new.

**TRANSIT EQUIPMENT COMPANY**
501 Fifth Ave., New York

FOR SALE

Single Truck

## SNOW SWEEPER

**J. W. GERKE**
303 Fifth Ave., New York, N. Y.

**NEW GEARS, PINIONS AND GEAR CASES FOR SALE**

**GE-1000 Motor:**
173 15 tooth pinions
107 69 tooth gears
16 Sheet iron gear cases

**GE-800 Motor:**
4 malleable gear cases and 3 bottom halves

FS-749, Electric Railway Journal
10th Ave. at 36th St., New York City

FOR SALE

## HEADLIGHT GLOBES

100 doz., No. 778; 75 doz., No. 786; 50 doz., No. 986, Macbeth brand. Absolutely new. Price $2.50 per dozen.

**C. F. BULOTTI MACHINERY CO.**
67-71 Main St., San Francisco, Cal.

WANTED

## LATHE

in good condition with at least 8 ft. between centers and 36-in. swing, suitable for turning wheels; motor driven preferred.

**ATLANTIC CITY & SHORE R.R. CO.**
Atlantic City, N. J.

WE WANT TO BUY

30—West. 306-C.V.-4

## MOTORS

Have you any to offer?

**ELECTRIC EQUIPMENT CO.**
Commonwealth Bldg., Philadelphia, Pa.

# WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

**Advertising, Street Car**
Collier, Inc., Barron G.

**Air Receivers & Aftercoolers**
Ingersoll-Rand Co.

**Anchors, Guy**
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

**Armature Shop Tools**
Elec. Service Supplies Co.

**Automatic Return Switch Stands**
Ramapo Ajax Corp.

**Automatic Safety Switch Stands**
Ramapo Ajax Corp.

**Axles**
Associated Spicer Co.
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Johnson & Co., J. B.
Laclede Steel Co.
Sheldon Axle & Spring Co.
St. Louis Car Co.
Westinghouse E. & M. Co.

**Axles (Front & Rear) Motor Bus and Passenger Car**
Associated Spicer Co.
Sheldon Axle & Spring Co.

**Babbitt Metal**
Ajax Metal Company

**Badges and Buttons**
Elec. Service Supplies Co.
International Register Co., The

**Barges Steel**
American Bridge Co.

**Bearings and Bearing Metals**
Ajax Metal Company
Bemis Car Truck Co.
Brill Co., J. G., The
General Electric Co.
More-Jones Brass & Metal Co.
St. Louis Car Co.
Westinghouse E. & M. Co.

**Bearings, Center and Roller Side**
Baldwin Locomotive Wks.
Stucki Co., A.

**Bells and Gongs**
Brill Co., The J. G.
Consolidated Car Heat. Co.
Elec. Service Supplies Co.
St. Louis Car Co.

**Bearings, Roller**
Norma-Hoffman Bearings Corp.

**Ballers**
Babcock & Wilcox Co.

**Bonding Apparatus**
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Track-work Co.

**Bonds, Rail**
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse E. & M. Co.

**Book Publishers**
McGraw-Hill Book Co.

**Boxes, Switch**
Johns-Pratt Co.

**Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)**
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

**Brake Adjusters**
Brill Co., The J. G.
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.

**Brake Shoes**
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.

**Brakes, Brake Systems and Brake Parts**
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
General Electric Co.
National Brake Co.
St. Louis Car Co.
Safety Car Devices Co.
Westinghouse Tr. Br. Co.

**Bridges, Steel**
American Bridge Co.

**Brushes, Carbon**
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Morganite Brush Co.
U. S. Graphite Co.
Westinghouse E. & M. Co.

**Brushes, Graphite**
Morganite Brush Co.
U. S. Graphite Co.

**Brushes, Wire, Pneumatic**
Ingersoll-Rand Co.

**Buildings, Steel**
American Bridge Co.

**Buses, Motor**
Brill Co., The J. G.
Garford Motor Truck Co.
International Motor Co.
New York Transportation Co.
St. Louis Car Co.

**Bushings, Case Hardened and Manganese**
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.

**Cables. (See Wires and Cables)**

**Cambric Tapes, Yellow and Black Varnish**
Acme Wire Co.
Irvington Varnish & Ins. Co.

**Carbon Brushes (See Brushes, Carbon)**

**Cars, Dump**
Brill Co., J. G., The
Differential Steel Car Co.
St. Louis Car Co.

**Car Lighting Fixtures**
Elec. Service Supplies Co.

**Car Panel Safety Switches**
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.

**Cars, Passenger, Freight, Express, etc.**
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

**Cars, Gas, Rail**
Brill Co., J. G., The
St. Louis Car Co.

**Cars, Second Hand**
Electric Equipment Co.
Transit Equipment Co.

**Cars, Self-Propelled**
Brill Co., J. G., The
General Electric Co.

**Car Wheels, Rolled Steel**
Bethlehem Steel Co.

**Castings, Brass, Composition or Copper**
Ajax Metal Company
Anderson Mfg. Co., A. & J. M.
More-Jones Brass & Metal Co.

**Castings, Gray Iron and Steel**
Bemis Car Truck Co.
Fort Pitt Steel Castings Co.
St. Louis Car Co.

**Castings, Malleable and Brass**
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Fort Pitt Steel Castings Co.
St. Louis Car Co.

**Catchers and Retrievers, Trolley**
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

**Catenary Construction**
Archbold-Brady Co.

**Ceilings, Plywood, Panels**
Haskelite Mfg. Co.

**Change Carriers**
Cleveland Fare Box Co.

**Circuit-Breakers**
Anderson, A. & J. M. Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Clamps and Connectors for Wires and Cables**
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co

**Cleaners and Scrapers Track (See also Snow-Plows, Sweepers and Brooms)**
Brill Co., The J. G.
St. Louis Car Co.

**Clusters and Sockets**
General Electric Co.

**Coal and Ash Handling (See Conveying and Hoisting Machinery)**

**Coil Banding and Winding Machines**
Elec. Service Supplies Co.

**Coils Armature and Field**
General Electric Co.
Westinghouse E. & M. Co.

**Coils, Choke and Kicking**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

**Coin Counting Machines**
Cleveland Fare Box Co.
Intern'l Register Co.
Johnson Fare Box Co.

**Coin Sorting Machines**
Cleveland Fare Box Co.

**Coin Wrappers**
Cleveland Fare Box Co.

**Commutator Slotters**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co

**Commutator Truing Devices**
General Electric Co.

**Commutators or Parts**
Cameron Elec'l Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Compressors, Air**
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.

**Compressors, Air Portable**
Ingersoll Rand Co.

**Concrete Reinforcing Bars**
Laclede Steel Co.

**Condensor Papers**
Irvington Varnish & Ins. Co

**Condensers**
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.

**Connectors, Solderless**
Frankel Connector Co.
Westinghouse E. & M. Co.

**Connectors, Trailer Car**
Consolidated Car Heat. Co.
Elec. Service Supplies Co.
Ohio Brass Co.

**Controllers or Parts**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Controller Regulators**
Elec. Service Supplies Co.

**Controlling Systems**
General Electric Co.
Westinghouse E. & M. Co.

**Converters, Rotary**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Conveying Machinery**
American Bridge Co.

**Copper Wire**
Anaconda Copper Mining Co.

**Cord, Bell, Trolley, Register**
Brill Co., The J. G.
Elec. Service Supplies Co.
Internat'l Register Co., The
Roebling's Sons Co., John A.
St. Louis Car Co.
Samson Cordage Works
Silver Lake Co.

**Cord Connectors and Couplers**
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

**Couplers, Car**
Brill Co., The J. G.
Ohio Brass Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co

**Cross Arms (See Brackets)**

**Crossing Foundations**
International Steel Tie Co

**Crossing, Frog & Switch**
Ramapo Ajax Corp.

**Crossing, Manganese**
Bethlehem Steel Co.
Ramapo Ajax Corp.

**Crossings**
Ramapo Ajax Corp.

**Crossings, Track (See Track, Special Work)**

**Crossings, Trolley**
Ohio Brass Co.

**Curtains & Curtain Fixtures**
Brill Co., The J. G.
Elec. Service Supplies Co.
Morton Mfg. Co.
St. Louis Car Co.

**Dealer's Machinery**
Elec. Equipment Co.
Hyman-Michaels Co.
Transit Equipment Co.

**Derailing Devices (See also Track Work)**

**Derailing Switches**
Ramapo Ajax Corp.

**Destination Signs**
Elec. Service Supplies Co.

**Detective Service**
Wish-Service, P. Edward

**Door Operating Devices**
Brill Co., The J. G.
Consolidated Car Heat. Co.
General Electric Co.
Nat'l Pneumatic Co., Inc.
St. Louis Car Co.
Safety Car Devices Co.

**Doors & Door Fixtures**
Brill Co., The J. G.
Consolidated Car Heat. Co.
General Electric Co.
Morton Mfg. Co.

**Doors, Folding Vestibule**
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.

**Drills, Rock**
Ingersoll-Rand Co.

**Drills, Track**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ingersoll-Rand Co.
Ohio Brass Co.

**Dryers, Sand**
Elec. Service Supplies Co

**Ears**
Ohio Brass Co.

**Economizers**
Power Specialty Co.

**Electrical Wires and Cables**
Amer. Electrical Works
Amer. Steel & Wire Co.
Roebling's Sons & Co., J. A.

**Electric Grinders**
Railway Track-work Co.
Western Electric Co.

**Electric Transmission Towers**
American Bridge Co.

**Electrodes, Carbon**
Railway Track-work Co.

**Electrodes, Steel**
Railway Track-work Co.

**Engineers, Consulting, Contracting and Operating**
Allison & Co., J. S.
Archbold-Brady Co.
Beeler, John A.
Bibbins, J. Rowland
Buchanan & Layng Corp.
Bureau of Commercial Economics, Inc.
Day & Zimmerman, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelly-Cooke Co.
Orr, Joe R.
Railway Audit & Inspection Co.
Richey, Albert S.
Robinson & Co., Dwight P.
Sanderson & Porter
Stevens & Wood
Stone & Webster
White Eng. Corp., The J. G.

**Engineering**
Equipment Engineering Co.

**Engines, Gas, Oil or Steam**
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.

**Fare Boxes**
Cleveland Fare Box Co.
Johnson Fare Box Co.
Nat'l Ry. Appliance Co.

**Fare Registers**
Ohmer Fare Register Co.

**Fences, Woven Wire and Fence Posts**
Acme Wire Co.
Amer. Steel & Wire Co.

**Fenders and Wheel Guards**
Brill Co., The J. G.
Consolidated Car Fender Co.
Elec. Service Supplies Co.
St. Louis Car Co.

**Fibre and Fibre Tubing**
Westinghouse E. & M. Co

**Field Coils (See Coils)**

**Floodlights**
Elec. Service Supplies Co.

**Forgings**
Brill Co., J. G., The

**Frogs & Crossings, Tee Rail**
Bethlehem Steel Co.
Ramapo Ajax Corp.

**Frogs, Track (See Track Work)**

**Frogs, Trolley**
Ohio Brass Co.

**Furnaces, Electric Steel Melting**
American Bridge Co.

**Fuses and Fuse Boxes**
Consolidated Car Heat. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Fuses, Cartridge, Non-Refillable & High Voltage**
Johns-Pratt Co.

**Fuses, Refillable**
General Electric Co.
Johns-Manville, Inc.
Johns-Pratt Co.

**Gaskets**
Westinghouse Tr. Br. Co.

**Gas Producers**
Westinghouse E. & M. Co.

**Gas-Electric Cars**
General Elec. Co.
Westinghouse E. & M. Co.

**Gates, Car**
Brill Co., The J. G.
St. Louis Car Co.

**Gear Blanks**
Bethlehem Steel Co.
Brill Co., J. G., The

**Gear Cases**
Chillingworth Mfg. Co.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

**Gears and Pinions**
Bemis Car Truck Co.
Bethlehem Steel Co.
Elec. Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

**Generating Sets, Gas-Electric**
General Electric Co

**Generators**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Girder Rails**
Bethlehem Steel Co.
Lorain Steel Co.

**Gong (See Bells and Gongs)**

**Greases (See Lubricants)**

**Grinders and Grind Supplies**
Indianapolis Switch & Frog Co.
Railway Track-work Co.

**Grinders, Portable**
Railway Track-work Co.

**Grinders, Portable Electric**
Railway Track-work Co.

**Grinding Bricks and Wheels**
Railway Track-work Co.

**Guard Rail Clamps**
Ramapo Ajax Corp.

**Guard Rails, Tee Rail & Manganese**
Ramapo Ajax Corp.

**Guards, Trolley**
Elec. Service Supplies Co.
Ohio Brass Co.

**Hammers, Pneumatic**
Ingersoll-Rand Co.

**Harps, Trolley**
Elec. Service Supplies Co.
More-Jones Brass Metal Co.
Nuttall Co., R. D.
Star Brass Works

**Headlights**
Elec. Service Supplies Co.
General Electric Co
Ohio Brass Co.
St. Louis Car Co.

**Headlining**
Haskelite Mfg. Co.
Panelyte Co.

**Heaters, Car (Electric)**
Consolidated Car Heat. Co.
Gold Car Heat & Ltg. Co.
Nat'l Ry. Appliance Co.
Smith Heater Co., Peter

**Heaters, Car, Hot Air and Water**
Elec. Service Supplies Co.
Smith Heater Co., Peter

**Heaters for Special Purposes**
Power Specialty Co.

**Helmets—Welding**
Railway Track-work Co.

**Hoisting Machinery**
American Bridge Co.

**Hoists, Portable**
Ingersoll-Rand Co.

**Hydraulic Machinery**
Allis-Chalmers Mfg. Co.

**Indicating Signals**
Oakes Equipment Co.

**Instruments Measuring, Testing and Recording**
Elec. Service Supplies Co.
General Electric Co.
Johns-Pratt Co.
Westinghouse E. & M. Co.

You're having brush trouble

CORRECT IT

USE LE CARBONE CARBON BRUSHES

They talk for themselves

COST MORE PER BRUSH
COST LESS PER CAR MILE

**W. J. Jeandron**
345 Madison Avenue, New York
Pittsburgh Office: 634 Wabash Bldg.
Chicago Office: 1657 Monadnock Block
San Francisco Office: 525 Market Street
Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal and Toronto



**Wet Passengers**

make poor "boosters" for your service in rainy weather.

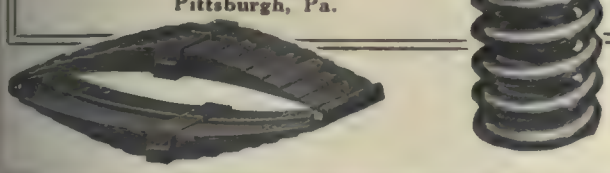
Breakdowns mean long delays and rain-drenched patrons...

**AJAX**
**BULL BEARING ALLOY**

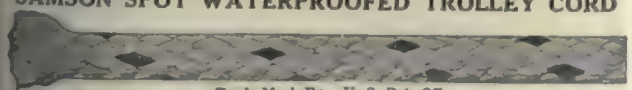
in the bearings keeps your lines running on schedule

**The Ajax Metal Company**
ESTABLISHED 1880
PHILADELPHIA
New York Chicago Boston Cleveland

Play for safety—
*plus resiliency—*
*plus long life*
*By specifying*
**FORT PITT SPRINGS**
FORT PITT SPRING & MFG. CO.
Pittsburgh, Pa.



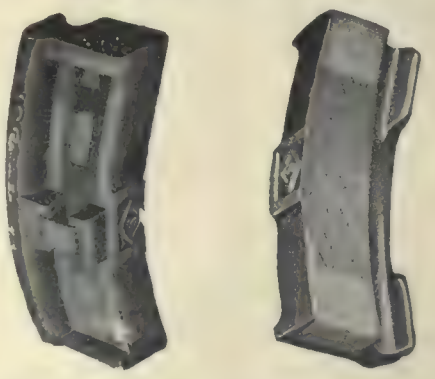
SAMSON SPOT WATERPROOFED TROLLEY CORD



Trade Mark Reg. U. S. Pat. Off.
Made of extra quality stock firmly braided and smoothly finished. Carefully inspected and guaranteed free from flaws. Samples and information gladly sent.
SAMSON CORDAGE WORKS, BOSTON, MASS.

100 New Users in the Last Nine Months
**KASS SAFETY TREADS**
HIGH
in efficiency and lasting qualities
LOW
in weight, initial and upkeep costs
Morton Manufacturing Co., Chicago

**BRAKE SHOES**
**AERA Standards**
**Brake Heads**



Diamond "S" Steel Back and Lug Shoes best for all equipment.

Manufactured and sold under U. S. Patent and Registered Trade Mark.

**American Brake Shoe and Foundry Co.**
**30 Church Street, New York**
332 So. Michigan Ave., Chicago

**Insulating Cloth, Paper and Tape**
General Electric Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Stand. Underground Cable Co.
Westinghouse E. & M. Co.

**Insulating, Silk & Varnish**
Irvington Varnish & Ins. Co.

**Insulation (See also Paints)**
Electric Ry. Equipment Co.
Elec. Service Suplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Westinghouse E. & M. Co.

**Insulation Slots**
Irvington Varnish & Ins. Co.

**Insulators (See also Line Materials)**
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse E. & M. Co.

**Insulator Pins**
Elec. Service Supplies Co.
Hubbard & Co.

**Insulators, High Voltage**
Lapp Insulator Co., Inc.

**Jacks (See also Cranes, Hoists and Lifts)**
Buda Co.
Elec. Service Supplies Co.

**Joints, Rail (See Rail Joints)**

**Journal Boxes**
Bemis Car Truck Co.
Brill Co., J. G.
Fort Pitt Steel Castings Co.
St. Louis Car Co.

**Junction Boxes**
Std. Underground Cable Co.

**Lamps, Guards and Fixtures**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

**Lamps, Arc & Incandescent (See also Headlights)**
General Electric Co.
Westinghouse E. & M. Co.

**Lamps, Signal and Marker**
Nichols-Lintern Co.
Ohio Brass Co.

**Lanterns, Classification**
Nichols-Lintern Co.

**Lightning Protection**
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Shaw, Henry M.
Westinghouse E. & M. Co.

**Line Material (See also Brackets, Insulators, Wires, etc.)**
Archbold-Brady Co.
Electric Ry. Equipment Co.
Elec. Service Sup. Co.
General Electric Co.
Hubbard & Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

**Locomotives, Electric**
Baldwin Locomotive Wks.
General Electric Co.
McGuire-Cummings Mfg. Co
St. Louis Car Co.
Westinghouse E. & M. Co.

**Lubricating Engineers**
Galena Signal Oil Co.
Texas Company
Universal Lubricating Co.

**Lubricants, Oil and Grease**
Galena Signal Oil Co.
Texas Company
Universal Lubricating Co.

**Manganese Parts**
Bemis Car Truck Co.

**Manganese Steel Castings**
Wm. Wharton, Jr. & Co.

**Manganese Steel Guards Rails**
Ramapo Ajax Corp.

**Manganese Steel, Special Track Work**
Bethlehem Steel Co.

**Manganese Steel Switches Frogs & Crossings**
Bethlehem Steel Co.
Ramapo Ajax Corp.

**Meters (See Instruments)**

**Molding, Metal**
Allis-Chalmers Mfg. Co.

**Motor Buses (See Buses, Motor)**

**Motors, Electric**
Allis-Chalmers Mfg. Co.
Westinghouse E. & M. Co.

**Motors and Generators, Sets**
Allis-Chalmers Mfg. Co.
General Electric Co.

**Motormen's Seats**
Brill Co., J. G.
Elec. Service Sup. Co.
Heywood-Wakefield Co.
St. Louis Car Co.
Wood Co., Chas. N.

**Nuts and Bolts**
Bemis Car Truck Co.
Bethlehem Steel Co.
Hubbard & Co.

**Oils (See Lubricants),**

**Oil Heaters**
Power Specialty Co.

**Omnibuses (See Buses, Motor)**

**Oxy-Acetylene (See Cutting Apparatus, Oxy-Acetylene)**

**Packing**
Elec. Service Suplies Co.
Westinghouse E. & M. Co.

**Paints and Varnishes (Insulating)**
Irvington Varnish & Ins. Co.

**Paints and Varnishes for Woodwork**
National Ry. Appliance Co

**Pavement Breakers**
Ingersoll-Rand Co.

**Paving Brick Vitrified**
National Paving Brick Mfrs. Assn.

**Paving Material**
Amer. Br. Shoe & Fdy. Co.

**Pickup, Trolley Wire**
Elec. Service Supplies Co.
Ohio Brass Co.

**Pinion Pullers**
Elec. Service Supplies Co
General Electric Co.
Wood Co., Chas. N.

**Pinions (See Gears)**

**Pins, Case Hardened, Wood and Iron**
Bemis Car Truck Co.
Elec. Service Sup. Co.
Ohio Brass Co.
Westinghouse Tr. Brake Co.

**Pipe Fittings**
Westinghouse Tr. Brake Co.

**Planers (See Machine Tools)**

**Plates for Tee Rail Switches**
Ramapo Ajax Corp.

**Pliers, Rubber Insulated**
Elec. Service Sup. Co.

**Pneumatic Tools**
Ingersoll-Rand Co. (A. S. Cameron Steam Pump Works)

**Pole Line Hardware**
Bethlehem Steel Co.
Ohio Brass Co.

**Poles, Metal Street**
Elec. Ry. Equipment Co.
Hubbard & Co.

**Pole Reinforcing**
Hubbard & Co.

**Poles & Ties Treated**
Bell Lumber Co.
International Creosoting & Construction Co.

**Poles, Ties, Posts, Piling & Lumber**
Bell Lumber Co.
International Creosoting & Construction Co.
Southern Cypress Mfrs. Assn.

**Poles, Trolley**
Bell Lumber Co.
Elec. Service Supplies Co.
Nuttall Co., R. D.

**Poles, Tubular Steel**
Elec. Ry. Equipment Co.
Elec. Service Sup. Co.

**Porcelain Special High Voltage**
Lapp Insulator Co., Inc.

**Portable Grinders**
Buda Company

**Potheads**
Okonite Co.

**Power Houses**
American Bridge Co.

**Power Saving Devices**
National Ry. Appliance Co
Railway Improvement Co.

**Pressure Regulators**
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

**Pumps**
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.

**Pumps, Vacuum**
Ingersoll-Rand Co.

**Punches, Ticket**
Bonney-Vehslage Tool Co.
Intern'l Register Co., The
Wood Co., Chas. N.

**Rail Braces & Fastenings**
Ramapo Ajax Corp.

**Rail Grinders (See Grinders)**

**Rail Joints**
Carnegie Steel Co.
Rail Joint Co.

**Rail Joints—Welded**
Lorain Steel Co.

**Rails, Relaying**
Foster Co., L. B.
Hyman-Michaels Co.

**Rails, Steel**
Bethlehem Steel Co.
Carnegie Steel Co.
Foster Co., L. B.

**Railway Paving Guards, Steel**
Godwin Co., Inc., W. S.

**Railway Safety Switches**
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.

**Rail Welding**
Railway Track-work Co.

**Rattan**
Brill Co., The J. G.
Elec. Service Supplies Co.
Heywood-Wakefield Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

**Registers and Fittings**
Brill Co., The J. G.
Elec. Service Supplies Co.
Intern'l Register Co., The
Rooke Automatic Register Co.
St. Louis Car Co.

**Reinforcement, Concrete**
Amer. Steel & Wire Co.

**Repair Shop Appliances (See also Coil Banding and Winding Machines)**
Elec. Service Supplies Co.

**Repair Work (See also Coils)**
General Electric Co.
Westinghouse E. & M. Co.

**Replacers, Car**
Elec. Service Sup. Co.

**Resistances**
Consolidated Car Heat. Co.

**Resistance, Wire and Tube**
General Electric Co.
Westinghouse E. & M. Co.

**Retrievers, Trolley (See Catchers and Retrievers, Trolley)**

**Rheostats**
General Electric Co.
Westinghouse E. & M. Co.

**Roofing Car**
Pantasote Co., Inc.

**Roofs**
Haskelite Mfg. Co.

**Sanders, Track**
Brill Co., The J. G.
Elec. Service Sup. Co.
Nichols-Lintern Co.
Ohio Brass Co.
St. Louis Car Co.

**Sash Fixtures, Car**
Brill Co., The J. G.
St. Louis Car Co.

**Scrapers, Track (See Cleaners and Scrapers, Track)**

**Screw Drivers, Rubber Insulated**
Elec. Service Sup. Co.

**Seats, Bus**
Brill Co., J. G., The
Heywood-Wakefield Co.
St. Louis Car Co.

**Seats, Car (See also Rattan)**
Brill Co. The J. G.
Heywood-Wakefield Co.
St. Louis Car Co.

**Seating Materials**
Brill Co., J. G.
Heywood-Wakefield Co.
Pantasote Co., Inc.
St. Louis Car Co.

**Second Hand Equipment**
Electric Equipment Co.
Hyman-Michaels Co.
Transit Equipment Co.

**Shades, Vestibule**
Brill Co., The J. G.

**Shovels**
Brill Co., The J. G.
Hubbard & Co.

**Side Bearings (See Bearings, Center and Side)**

**Signals, Car Starting**
Consolidated Car. Heat Co.
Elec. Service Sup. Co.
Nat'l Pneumatic Co., Inc.

**Signals, Indicating**
Nichols-Lintern Co.
Oakel Equipment Co.

**Signal Systems, Highway Crossing**
Nachod Signal Co., Inc.
Wood Co., Chas. N.

**Signal Systems, Block**
Elec. Service Sup. Co.
Nachod Signal Co., Inc.

**Slack Adjusters (See Brake Adjusters)**

**Sleet Wheels and Cutters**
Anderson Mfg. Co., A. & J. M.
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.

**Smokestacks, Car**
Nichols-Lintern Co.

**Sockets & Receptacles**
National Metal Molding Co.

**Snow Sweepers, Rattan**
Heywood-Wakefield Co

**Snow-Plows, Sweepers and Brooms**
Brill Co., The J. G.
Consolidated Car Fender Co
McGuire-Cummings Mfg. Co
St. Louis Car Co.

**Soldering and Brazing Apparatus (See Welding Processes and Apparatus)**
Irvington Varnish & Ins. Co.

**Solderless Connector**
Frankel Connector Co.

**Special Adhesive Papers**
Irvington Varnish & Ins. Co.

**Special Trackwork**
Bethlehem Steel Co.
Lorain Steel Co.

**Spikes**
Amer. Steel & Wire Co.

**Splicing Compounds**
Westinghouse E. & M. Co.

**Splicing Sleeves (See Clamps and Connectors)**

**Springs, Car and Truck**
Amer. Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Fort Pitt Spring & Mfg. Co.
St. Louis Car Co.

**Sprinklers, Track and Road**
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

**Steel and Steel Products**
Carnegie Steel Co.

**Steps, Car**
Brill Co., J. G., The
Morton Mfg. Co.

**Stokers, Mechanical**
Babcock & Wilcox Co.
Westinghouse E. & M. Co.

**Stop Signals**
Nichols-Lintern Co.
Oakel Equipment Co.

**Storage Batteries (See Batteries, Storage)**

**Strain, Insulators**
Anderson, A. & J. M. Mfg. Co.
Ohio Brass Co.

**Strand**
Roebling's Sons Co., J. A.

**Straps, Car, Sanitary**
Railway Improvement Co.

**Subway Boxes**
Johns-Pratt Co.

**Superheaters**
Babcock & Wilcox Co.

**Sweepers, Snow (See Snow Plows, Sweepers and Brooms)**

**Switches, Safety**
Johns-Pratt Co.

**Switches, Selector**
Nichols-Lintern Co.

**Switches, Tee Rail**
Ramapo Ajax Corp.

**Switches, Track (See Track Special Work)**

**Switches and Switchboards**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

**Tamper Tie**
Ingersoll-Rand Co.
Railway Track-work Co.

**Tapes and Cloths (See Insulating Cloth, Paper and Tape)**

**Tee Rail Special Track Work**
Bethlehem Steel Co.
Ramapo Ajax Corp.

**Telephones and Parts**
Elec. Service Supplies Co.

**Terminals, Cable**
Std. Underground Cable Co

**Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)**

**Thermostats**
Consolidated Car Heat. Co.
Gold Car Heat. & Ltg. Co.
Railway Utility Co.
Smith Heater Co., Peter

**Ticket Choppers & Destroyers**
Elec. Service Supplies Co.

**Ties, All-Metal**
Metal Safety R. R. Tie Co

**Ties, Mechanical**
Dayton Mechanical Tie Co

**Ties and Tie Rods, Steel**
Carnegie Steel Co.
International Steel Tie Co

**Ties, Wood Cross (See Poles, Ties, Posts, etc.)**

**Tool Steel**
Bethlehem Steel Co.

**Tools, Track & Miscellaneous**
Amer. Steel & Wire Co.
Elec. Service Supplies Co
Hubbard & Co.
Railway Track-work Co.

**Torches, Acetylene (See Cutting Apparatus)**

**Towers and Transmission Structures**
Archbold-Brady Co.
Westinghouse E. & M. Co

**Track Grinders**
Railway Track-work Co.

**Track, Special Work**
N. Y. Switch & Crossing Co

**Trackless Trolley Cars**
Brill Co., J. G. The
St. Louis Car Co.

**Track, Special Work**
Bethlehem Steel Co.
Buda Company
Columbia Machine Wks. & M. I. Co.
Ramapo Ajax Corp.

**Transfer (See Tickets)**

**Transfer Tables**
American Bridge Co.

**Transformers**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Treads, Safety, Stair, Car Step**
Morton Mfg. Co.

**Trolley Bases**
Elec. Service Supplies Co.
General Electric Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Ohio Brass Co.

**Trolley Bases, Retrieving**
Elec. Service Supplies Co.
Nuttall Co., R. D.
Ohio Brass Co.

**Trolley Buses**
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.

**Trolley Material, Overhead**
Anderson, A. & J. M. Mfg. Co.
Elec. Service Supplies Co
More-Jones Brass & Metal Co.
Ohio Brass Co.

**Trolley Shoe**
Miller Trolley Shoe Co.

**Trolley Wheel Bushings**
More-Jones Brass & Metal Co.

**Trolley Wheels & Harps**
More-Jones Brass & Metal Co.

**Trolley Wheels (See Wheels, Trolley)**

**Trolley Wire**
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Bridgeport Brass Co.
Roebling's Sons Co., J. A.

**Trucks, Car**
Baldwin Locomotive Wks
Bemis Car Truck Co
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
Taylor Elec Truck Co.

**Tubing, Yellow & Black Flexible Varnish**
Irvington Varnish & Ins. Co.

**Turbines, Steam**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Turbines, Water**
Allis-Chalmers Mfg. Co.

**Turnstiles**
Elec. Service Supplies Co
Perey Mfg. Co., Inc

**Turntables**
American Bridge Co.

**Valves**
Ohio Brass Co.
Westinghouse Tr. Br. Co.

**Varnished Papers & Silks**
Acme Wire Co.
Irvington Varnish & Ins. Co.

**Ventilators, Car**
Brill Co., The J. G.
Nat'l Ry Appliance Co
Nichols-Lintern Co.
Railway Utility Co.
St. Louis Car Co.

**Vitrified Paving Brick**
National Paving Brick Assn.

**Welded Rail Joints**
Alumino-Thermic Corp.
Elec. Ry. Improvement Co.
Ohio Brass Co.
Railway Track-work Co.

**Welders, Portable Electric**
Elec. Ry. Improvement Co
Ohio Brass Co.
Railway Track-work Co

**Welding Processes and Apparatus**
Alumino-Thermic Corp
Elec. Ry Improvement Co.
General Electric Co.
International Oxygen Co
Ohio Brass Co
Railway Track-work Co
Westinghouse E & M. Co.

**Welding Steel**
Elec. Ry Improvement Co.
Railway Track-work Co.

**Wheel Guards (See Fenders and Wheel Guards)**

**Wheel Presses (See Machine Tools)**

**Wheels, Car, Cast Iron**
Bemis Car Truck Co.
Carnegie Steel Co.

**Wheels, Wrought Steel**
Carnegie Steel Co

**Wheels, Trolley**
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Star Brass Works.

**Whistles, Air**
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

**Wire Rope**
Roebling's Sons Co., J. A.

**Wires and Cables**
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Bridgeport Brass Co.
General Electric Co.
Kerite Insulated Wire & Cable Co
Okonite Co.
Roebling's Sons Co., J. A.
Std Underground Cable Co
Westinghouse E. & M. Co.

# BUY BRUSHES
## MADE IN THE U. S. A.

VSG

**CARBON—GRAPHITE—METAL**
**MOTOR AND GENERATOR BRUSHES**

**Meet every requirement**

Grade recommendations, based upon your individual requirements and operating conditions, made by experienced Brush Engineers, guarantee long life and perfect service.

*Write for Catalog B-3.*

**THE UNITED STATES GRAPHITE COMPANY**
SAGINAW, MICHIGAN, U. S. A.



*"Differential Two-Car Train. Trailer dumping load clear of trench."*

# DIFFERENTIAL CARS
**Standard on Fifty Railways for**

| | |
|---|---|
| Track Maintenance | Track Construction |
| Ash Disposal | Hauling Crossties |
| Placing Ballast | Disposal of Waste |
| Coal Hauling | Snow Disposal |

Concrete Materials to the Job
Excavated Material to the Dump

***For Economy***

THE CLARK CONCRETE BREAKER
THE DIFFERENTIAL BOTTOM DUMP CAR
THE DIFFERENTIAL COMBINATION CAR-WHEEL TRUCK and TRACTOR

**THE DIFFERENTIAL STEEL CAR CO.**
Findlay, Ohio, U. S. A.

## Waterproofed Trolley Cord

SILVER LAKE A

Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

**FOR POSITIVE SATISFACTION ORDER SILVER LAKE**

If you are not familiar with the quality you will be surprised at its **ENDURANCE** and **ECONOMY.**

***Sold by Net Weights and Full Lengths***

**SILVER LAKE COMPANY**
*Manufacturers of bell, signal and other cords.*
Newtonville, Massachusetts

## The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



**THE STAR BRASS WORKS**
KALAMAZOO, MICH., U. S. A.

## RAILWAY UTILITY COMPANY

CAR COMFORT WITH
**UTILITY**
HEATERS
REGULATORS
VENTILATORS

141-151 West 23d St. Chicago, Ill. — *Write for Catalogue* — 1328 Broadway New York, N. Y.

For better Axles Specify
**"VALSCO"**
**HEAT TREATED CAR AXLES**
**LACLEDE STEEL CO.**
Arcade Bldg. St. Louis, Mo.



**MORE-JONES "TIGER-BRONZE" AXLE AND ARMATURE BEARINGS**

*Not always the cheapest, but ever lowest in ultimate cost*

**MORE-JONES BRASS & METAL CO.**
St. Louis, Missouri.

# ALPHABETICAL INDEX TO ADVERTISEMENTS


Page

A

Ajax Metal Co. ..... 61
Allison Co., J. E. ..... 45
Allis-Chalmers Mfg. Co. ..... 56
Alumino-Thermic Corp. ..... 56
Amer. Brake Shoe & Fdy. Co.. 61
American Bridge Co. ..... 45
American Car Co. ..... 34-35, 65
American Electrical Works. .... 54
American Steel & Wire Co. ..... 55
Anaconda Copper Mining Co. . 54
Anderson Mfg. Co., A. & . M.. 54
Archbold-Brady Co. ..... 45
Associated Spicer Co. ..... 50

B

Babcock & Wilcox Co. ..... 56
Baldwin Locomotive Works... 53
Beeler, John A. ..... 44
Bell Lumber Co. ..... 64
Bemis Car Truck Co. ..... 36
Bethlehem Steel Co. ..... 55
Bibbins, J. Rowland ..... 44
Bonney-Vehslage Tool Co. ..... 58
Bridgeport Brass Co. ..... 28
Brill Co., The J G. ..... 34-35, 65
Buchanan & Layng Corp .... 45
Buda Co. ..... 58
Bureau of Comm. Economies, Inc. ..... 45

C

Cameron Electrical Mfg. Co.... 56
Carnegie Steel Co ..... 56
Chillingworth Mfg Co. ..... 64
Cleveland Fare Box Co. ..... 58
Collier, Inc., Barron G..Front Cover
Consolidated Car Fender Co.... 29
Consolidated Car Heating Co... 17

D

Day & Zimmermann, Inc. .... 44
Dayton Mech. Tie Co ..... 53
Differential Steel Car Co., The.. 63

E

Electric Equipment Co. ..... 61
Electric Ry. Equipment Co.... 54
Elec. Ry. Improvement Co.... 56
Electric Service Supplies Co..20-21

Page

F

"For Sale" Ads. ..... 59
Ford Bacon & Davis ..... 44
Fort Pitt Spring & Mfg. Co.... 61
Foster Co., Inc., L. B. ..... 56

G

Garford Motor Truck Co . .. 7
Galena Signal Oil Co. ..... 41
General Electric Co 42, Back Cover
Gilbert & Sons, B. F. Co., A.... 44
Globe Ticket Co. ..... 30
Gold Car Heating & Ltg. Co.... 58

H

Hale-Kilburn Co ..... 58
Haskelite Mfg. Co . .... 58
"Help Wanted" Ads. .. .. 59
Hemphill & Wells .. .. 44
Heywood Wakefield Co. ..... 58
Holst, Englehard W . .. 44
Hubbard & Co . .. 54
Hyman Michaels Co .... 59

I

Ingersoll-Rand Co . .. 38
International Creo & Const. Co 18
International Motor Co. .....8-9
International Register Co., The. 58
International Steel Tie Co., The. 5
Irvington Varnish & Insulator Co. 57

J

Jackson, Walter ..... 44
Jeandron W J. ..... 61
Johns-Pratt Co. ..... 54
Johnson & Co., Inc., J. B. ..... 64
Johnson Fare Box Co. ..... 58

K

Kelly Cooke Co . ..... 44
Kerite Ins. Wire & Cable Co. . 55
Kuhlman Car Co. .....34-35, 65

Page

L

Laclede Steel Co.... ..... 63
Lapp Insulator Co., Inc. .. 54
Le Carbone Co.... ... 61
Lorain Steel Co . . 55

M

McGraw Hill Book Co., Inc 47
McGuire Cummings Mfg Co . 58
Miller Trolley Shoe Co. .....26-27
More-Jones Brass & Metal Co.. 63
Morganite Brush Co., Inc. ..... 51
Morton Mfg Co ..... 61

N

Nachod Signal Co. ..... 52
National Brake Co. .....37, 43
National Paving Brick Mfrs Assn ... ... 46
National Pole Co.... .. 6
National Pneumatic Co Inc 22-23
National Ry Appliance Co . 57
New York Transportation Co 39
New York Switch & Crossing Co 55
Nichols Lantern Co 57
Northern Texas Traction Co. 12-13
Nuttall Co R D .. 52

O

Ohio Brass Co. .....18-19
Okonite Co., The. ..... 57
Ong, Joe B. ..... 44
Oskel Equipment Co ..... 57

P

Pancelyte Co ..... 57
Percy Mfg Co., Inc . 58
Positions Wanted and Vacant.. 59
Power Specialty Co ..... 56

R

Rail Joint Co. ..... 55
Railway Audit & Inspection Co. 45

Page

Railway Track-work Co. ..... 10
Railway Utility Co ..... 63
Ramapo Ajax Corp ..... 56
Richey, Albert S. ..... 44
Robinson Co., Dwight P. ..... 44
Roebling's Sons Co., John A... 54
Rooke Automatic Register Co.. 57

S

St Louis Car Co .. ..... 32
Safety Car Devices Co . ...24-25
Samson Cordage Works .... 61
Sanderson & Porter .... 44
Searchlight Section .... .. 59
Shaw, Henry M. ..... 54
Sheldon Axle & Spring Co.... 50
Sherwin-Williams Co Inc. ... 31
Silver Lake Co ..... 63
Skayef Ball Bearing Co. .....33
Smith Heater Co., Peter. ..... 57
Southern Cypress Mfrs Assn 51
Standard Underground Cable Co 54
Star Brass Works .. .... 63
Stevens & Wood Inc . ..... 44
Stone & Webster . .. 11, 44
Stucki Co., A . .. 64

T

Texas Co . .... 10
Tool Steel Gear & Pinion Co.. 49
Transit Equipment Co 61

U

Universal Lubricating Co.. . 57
U S Graphite Co . ... 63

W

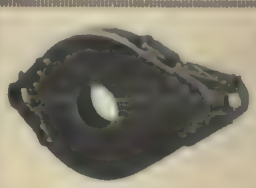
Want" Ads .... 59
Wason Mfg Co. . 65
Westinghouse Elec. & Mfg. Co. 2, 4, 14-15
Westinghouse Traction Brake Co 40
White Eng. Corp., The J. G. ... 44
Wish Service The P Edw. ... 45
Wood Co., Chas N. ..... 54



**Northern CEDAR POLES Western**

We guarantee
all grades of poles; also any butt-treating specifications

**BELL LUMBER COMPANY**
Minneapolis, Minn.



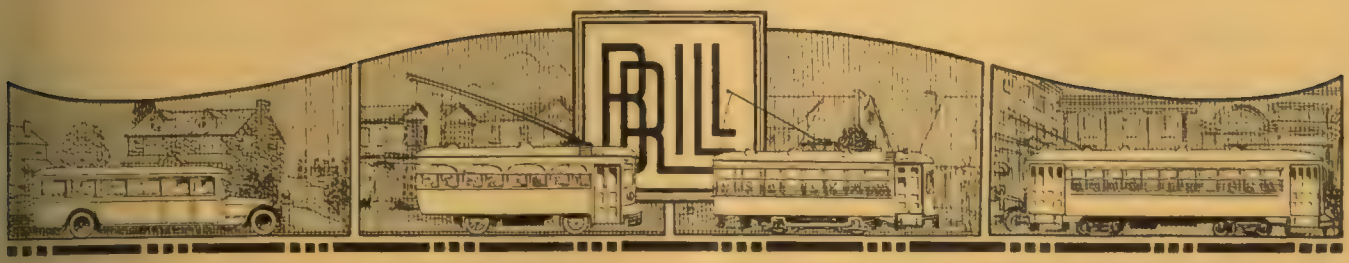
**CHILLINGWORTH**
One-Piece Gear Cases
Seamless—Rivetless—Light Weight
Best for Service—Durability and Economy. *Write Us.*
**Chillingworth Mfg. Co.**
Jersey City, N. J.



**STUCKI SIDE BEARINGS**
A. STUCKI CO.
Oliver Bldg.
Pittsburgh, Pa.

"Axle Specialists Since 1866"
Address all Mail to Post Office Box 515, Richmond, Va.

**CAR AXLES**
**J. R. JOHNSON AND CO., INC.**
FORGED STEEL AXLES
For Locomotives, Passenger, Freight and Electric Cars
Smooth Forged or Rough Turned—Carbon or Alloy Steel—Plain or Heat Treated, Forged and Turned Piston Rods, Crank Pins, Large Shafts, Round Bars, etc.






# Beaumont Convention Car



## Wins Public Approval

Word comes from Beaumont, Texas, that the seven double-truck Birney Safety Cars recently built at the plant of the American Car Company have received the public's heartiest approval. One car was placed on exhibition in the Interurban terminal in Beaumont and the public given the opportunity to inspect it thoroughly.

**This is the same type car shown by us at recent Atlantic City Convention. It measures 40 ft. 1 in. overall, seats 48 passengers and weighs 28,500 lb. complete. Trucks are the Brill 77-E-1 type for low-level light-weight cars.**

**THE J. G. BRILL COMPANY**
PHILADELPHIA, PA.
AMERICAN CAR CO — ST LOUIS MO — G.C. KUHLMAN CAR CO. CLEVELAND OHIO. — WASON MANF'G CO. SPRINGFIELD, MASS.






CP-27



GE-264

General Electric Company
Schenectady, N. Y.

# Lighter Weight in Fort Wayne

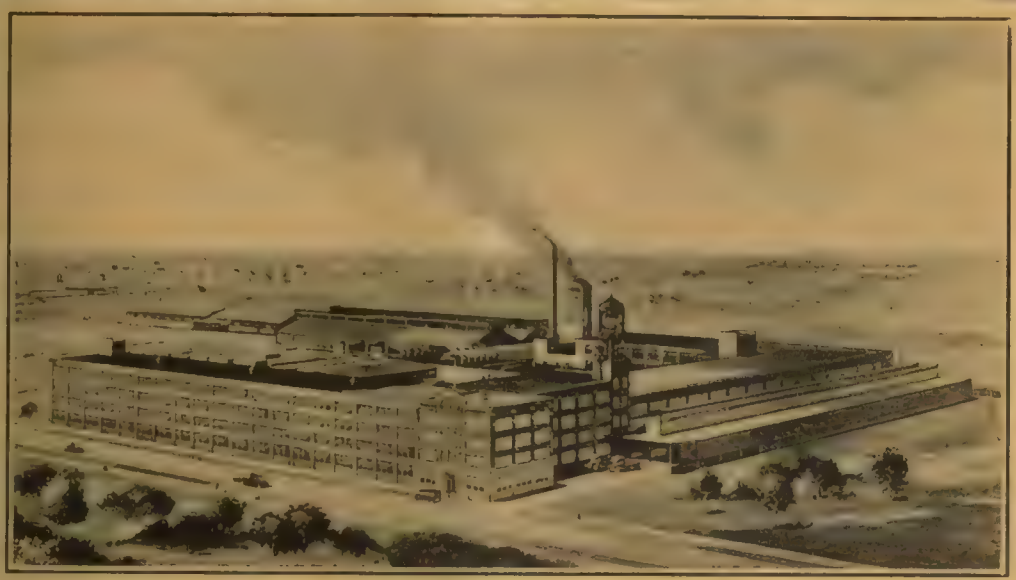
Another installation where GE-264 Motors, K-Control with Line Breakers, and CP Compressors are proving successful.

The Indiana Service Corporation, Fort Wayne, has in operation 15 cars, 31,000 lb. complete, with this equipment.

cGraw-Hill Company, Inc. November 29, 1924 Twenty Cents Per Copy

# ELECTRIC RAILWAY JOURNAL

HOUSTON PUBLIC LIBRA
LYCEUM AND CARNEGIE
ON, TEXAS.



*The Large and Modern Plant of the Lang Body Company, Cleveland*

LANG
BODIES

*A Product of Transportation*

CREATED largely by railway men who know the needs of passenger transportation.

FABRICATED by men whose first law is quality.

PRODUCED on a quantity basis to lower the price.

MADE to match the durability of the finest chassis.

ADOPTED by experienced operators and by chassis builders.

*"By their Quality, you will know them"*

THE LANG BODY COMPANY, CLEVELAND




# AFTER TWELVE YEARS

of successful operation on alternating-current traction motors, the detachable carbon-box brushholder has been applied to direct-current operation.

Renewal Boxes can be furnished with the closed or open-front construction. The closed front, having greater wearing surface, increases brush mileage.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of the
United States and Foreign Countries







# Westinghouse

*Vol. 64, No. 22* New York, November 29, 1924 *Pages 907-944*

# ELECTRIC RAILWAY JOURNAL

MORRIS BUCK
Associate Editor
C. W. SQUIER
Associate Editor
JOHN A. MILLER, JR.
Assistant Editor
G. J. MACMURRAY
News Editor

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

CHARLES GORDON
Western Editor
Old Colony Bldg., Chicago
MERRILL B. KNOX
Editorial Assistant
Old Colony Bldg., Chicago
CARL W. STOCKS
Associate Editor

## CONTENTS

**Editorials** ..... 907

**Buses Amplify Transportation in Decatur, Ill.** ..... 909
Unified car-bus system gives transportation service to Illinois city of 45,000. Fifteen modern buses supplement street cars with free transfer privileges. Transfer house in center of business district is starting point for all cars and buses.

**Detroit Car Cards** ..... 911

**Changing a Deficit Into a Profit** ..... 912
In four years the Charleston Consolidated Railway & Lighting Company has reduced operating expenses per car-mile 35 per cent while the gross earnings decreased 30 per cent.

**Oklahoma City Enlarges Passenger Station** ..... 912
The station, built in 1911, had become outgrown and has just been enlarged. It now has six through tracks. A new freight station has also been built.

**Replacing Cable on the Mount Lowe Incline** ..... 914

**Modern Planning System in Detroit Shops** ..... 915
BY G. L. OHMART.
Department of Street Railways has developed a system of checking the progress of work on cars in various departments of the Highland Park shops. Cumulative curves give daily information on production.

**The Readers' Forum** ..... 917

**American Association News** ..... 918

**Committee Appointments of 1924-1925, American and Engineering Associations** ..... 918

**News of Other Associations** ..... 921

**Public Relations Discussed at West Virginia Meeting** ..... 921
Water power and regulation were other topics at a two-day meeting of the West Virginia Public Utilities Association, held in Charleston, on Nov. 14-15.

**Efficient Bus Lighting** ..... 922
BY L. C. PORTER AND A. C. ROY.

**City Fares in Northern and Central Europe** ..... 924
BY AUGUST WINTER.
The use of the flat zone fares is fairly equal. In addition there is a general use of special rates for workmen and moderate riders, either with individual ride or season tickets.

**Equipment and Possibilities of One-Man Car** ..... 926
BY T. EGBERT VAN PUTTEN AND EINAR HELTMAN.
More than half the operators use one-man cars. The Amsterdam design has electro-mechanical safety devices, and like Malmö, uses passenger stop light instead of bell or buzzer signal.

**Maintenance of Equipment** ..... 928

**News of the Industry** ..... 931

**Financial and Corporate** ..... 939

**Personal Mention** ..... 942

**Manufactures and the Markets** ..... 943

**McGraw-Hill Company, Inc., Tenth Ave. at 36th St., New York**

JAMES H. MCGRAW, President
ARTHUR J. BALDWIN, Vice-President
MALCOLM MUIR, Vice-President
E. J. MEHREN, Vice-President
MASON BRITTON, Vice-President
JAMES H. MCGRAW, JR., Vice-Pres. and Treas.
C. H. THOMPSON, Secretary

WASHINGTON:
Colorado Building
CHICAGO:
Old Colony Building
PHILADELPHIA:
Real Estate Trust Building
CLEVELAND:
Leader-News Building
ST. LOUIS:
Star Building
SAN FRANCISCO:
883 Mission Street
LONDON:
6 Bouverie Street, London, E. C. 4

Member Associated Business Papers, Inc.
Member Audit Bureau of Circulations

1924

Cable Address: "Machinist, N. Y."

Publishers of
*Engineering News-Record*
*American Machinist*
*Power*
*Chemical and Metallurgical Engineering*
*Coal Age*
*Engineering and Mining Journal-Press*
*Ingeniería Internacional*
*Bus Transportation*
*Electric Railway Journal*
*Electrical World*
*Electrical Merchandising*
*Journal of Electricity*
*(Published in San Francisco)*
*Industrial Engineer*
*(Published in Chicago)*
*Electrical Retailing*
*(Published in Chicago)*
*American Machinist—European Edition*
*(Published in London)*

The annual subscription rate is $4 in the United States, Canada, Mexico, Alaska, Hawaii, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, Colombia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brazil, Spain, Uruguay, Costa Rica, Ecuador, Guatemala and Paraguay. Extra foreign postage to other countries $3 (total $7 or 29 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid to any part of the world, 20 cents.

Change of Address—When change of address is ordered the new and the old address must be given, notice to be received at least ten days before the change takes place.

Copyright, 1924, by McGraw-Hill Company, Inc.

Published weekly. Entered as second-class matter, June 23, 1908, at the Post Office, at New York, under the Act of March 3, 1879. Printed in U.S.A.

## *The Ostrich Habit*

ACCORDING to popular theory the ostrich sticks his head in the sand when he is frightened, and thinks that because he cannot see he cannot be seen. It would be just as effective, or ineffective, if he simply closed his eyes, although that really would accomplish nothing except to satisfy his silly ostrich mind.

Some people are like the ostrich. They close their eyes to what they don't want to see and then seem to think that it does not exist.

The JOURNAL does not believe in imitating the ostrich. In the electric railway industry things sometimes occur which are rather disheartening. But it does no good to ignore them. On the contrary, there may be a valuable lesson in them for the future.

In our opinion if a thing is true it's of interest to the industry. Acting on this theory we publish all kinds of news, good or bad, cheerful or discouraging. This, we believe, our readers have a right to expect. Happily the items of bad news nowadays are well-nigh lost in the mass of good news.

**Number of Copies Printed, 6,250**

**Advertising Index—Alphabetical, 40; Classified, 36, 38; Searchlight Section, 35**




# Westinghouse No. 335 Varnish

A great accumulation of experience and the resources of the Westinghouse Research Laboratories contribute to the production of this high-grade, black, baking varnish.

It produces a glossy film which is tough and flexible and has high dielectric strength. For apparatus which is subjected to oil, or for armature, magnet and other coils which operate under trying conditions, this varnish is a proven success.

If you are interested, we shall be glad to send you our booklet entitled — Westinghouse Insulating Varnishes and Compounds.




Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of the
United States and Foreign Countries

# Westinghouse




# Always Keep a Supply on Hand

For a lot of heat at little cost use Westinghouse Space Heaters. You'll find them wonderfully serviceable, dependable and convenient. Many concerns keep a supply on hand for the many uses to which they adapt themselves.

Many devices that require certain temperatures at hard-to-get-at spots are doing better work since the installation of this handy heat unit. Watchman shanties are now comfortable; cold corners are no longer traps for catching colds.

In progressive plants everywhere Westinghouse Space Heaters are providing heat *where* wanted *when* wanted — and lots of it, at little cost. Ask any Westinghouse Office.

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY
EAST PITTSBURGH, PA.
Sales Offices in All Principal Cities of the United States and Foreign Countries
Tune in with KDKA—KYW—WBZ—KFKX

## Use Westinghouse Space Heaters For Heating

Crane Cabs
Dryers
Fuel Oil Tanks
Watchman Shanties
Cold corners
Drafty places

— and anywhere else electricity can be utilized to provide comfort, health, safety, and improve process or product.

# Westinghouse

# What your public wants

It's easy to state it:

> "Clean, well-painted, well-lighted cars operated on regular schedules over *well-maintained track.*"

And the last comes first. The clean, bright, light cars will be comfortable only on well-maintained track. Regular schedules can be operated only on well-maintained track.

Well-maintained track is economically achieved only by efficient welding and constant rail grinding. Here is the equipment for that job.

*Get a quotation*

**Railway Trackwork Co.**

3132-48 East Thompson Street, Philadelphia

AGENTS:
Chester F. Gailor, 30 Church St., New York
Chas. N. Wood Co., Boston
Electrical Engineering & Mfg. Co., Pittsburgh
Atlas Railway Supply Co., Chicago
Equipment & Engineering Co., London

(332)



"Reciprocating" Track Grinder



"Universal" Rotary Track Grinder



"Atlas" Rail Grinder



"Hercules" Swing Frame Rail Grinder



"Ajax" Electric Arc Welder



# Tomlinson Automatic Couplers

## Radial—With Air Connection—With or Without Electric Connection

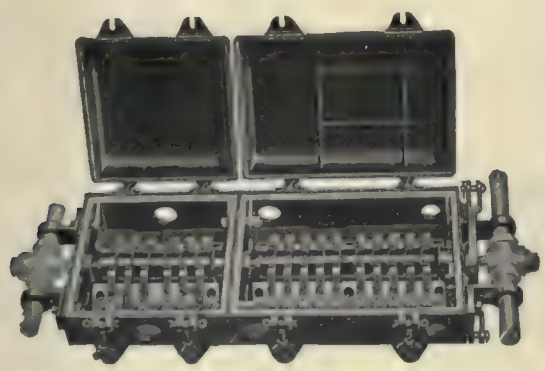
Tomlinson Couplers operate with easy flexibility even in the most extreme of track and car combinations. They function efficiently in coupling or uncoupling because of simplicity in construction and manipulation.

The simple and easy mechanics of their motion up and down in the patented spring carrier—or radially around the anchorage pivot point—insures smooth response to abrupt grade changes, to sharp curves, to uneven track.



**Electric Coupler**

Electric coupler contact block that bolts to the side of coupler head. Made for control circuits or bus line.



**Electric Disconnecting Switch**

Drum switch for use with electric coupler. Automatically disconnects electric lines before coupler is released. Interlocked with air brake line.

**Investigate a Tomlinson-equipped Property**

**The Ohio Brass Co.**

**Mansfield, Ohio, U.S.A.**

OLLEY MATERIAL — ELECTRIC RAILWAY CAR EQUIPMENT — RAIL BONDS — HIGH TENSION RCELAIN INSULATORS — THIRD RAIL INSULATORS

NEW YORK — PHILADELPHIA — PITTSBURGH CHICAGO — CHARLESTON, W. VA. LOS ANGELES — SAN FRANCISCO — PARIS, FRANCE

Dominion Insulator & Mfg. Co., Limited Niagara Falls, Ontario, Canada



# As the heart functions—

—to pump life blood through the human organism, so the compressor acts as a correspondingly vital element of the air brake system in providing "fluid" for actuating the brake.

Westinghouse Air Compressors are built to meet the severe demands of street railway service. No "organic" defect is in their make-up, and only a reasonable amount of care and attention is needed to avert "functional" trouble. If maintained in a normal state of health they will need no "doctoring," and a long life of usefulness and efficient service is assured.

The "Bungalow" Compressor, built in sizes suitable for all classes of traction service, has proved to be a favorite because of its compact design, light weight, extreme accessibility, and dependable performance. Other types and sizes of Westinghouse Air Compressors have given a correspondingly high degree of satisfaction.

**Westinghouse Traction Brake Co.**
*General Offices and Works:*
Wilmerding, Pa.

# WESTINGHOUSE TRACTION BRAKES



# THE FIFTEENTH YEAR

**37%** More Twin Ties sold than in 1923.

**80%** Sold to Companies with upwards of 13 years experience with Steel Tie Construction.

**20%** Sold to new customers.

There is a definite relation between this record year for sales of Steel Twin Ties and Track Costs for initial installation and maintenance on over 147 properties in the United States and Canada.

While the complete presentation of this data in our book, "Steel Tie Track Construction" is persuasive, it is not dangerous.

Expose yourself to it by directing us to mail it to your office or home.

**THE INTERNATIONAL STEEL TIE COMPANY**
**Cleveland, Ohio**

# Steel Twin Tie Track

**Renewable Track · · Permanent Foundation**

# CENTRALIZED RESPONSIBILITY

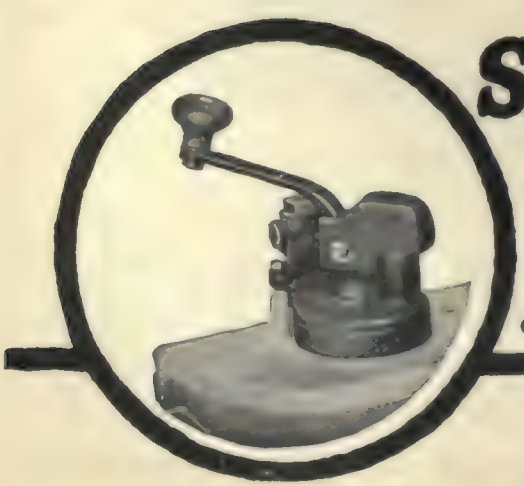
## Reduces Accident Hazard



## SAFETY CARS

Experience shows that fewer accidents result when operating responsibility is centralized in one man and NOT DIVIDED between two.

Every accident is an expense. Fewer accidents mean less expense, GREATER PROFITS.



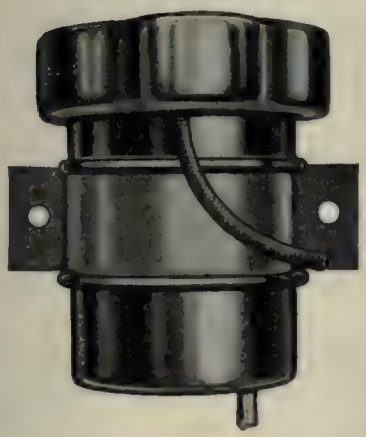
**SAFETY CAR DEVICES CO.**
OF ST. LOUIS, MO.

*Postal and Telegraphic Address:*
**WILMERDING, PA.**

CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH

# KEYSTONE LIGHTNING ARRESTER

## *Type IC*



*FEATURES:*

**They are entirely self-contained.**

**Easily installed.**

**Small size makes them practical on crowded poles and in cars.**

**No inspection required.**

**Minimum depreciation.**

**Remarkably efficient.**

Keystone Type IC Lightning Arresters are self-contained units, wholly encased in porcelain, which have been designed to fill the demand for a porcelain-enclosed device for either car or line service.

This lightning arrester is small enough to be used on the most crowded pole or in any location in a car—yet—their high efficiency insures full protection on trolley and feeder lines.

***Send for our Bulletin 197 just off the press. It contains much information of value. Ask us to quote prices on your next order.***

## ELECTRIC SERVICE SUPPLIES CO.

PHILADELPHIA
17th and Cambria Sts.

PITTSBURGH
829 Oliver Building

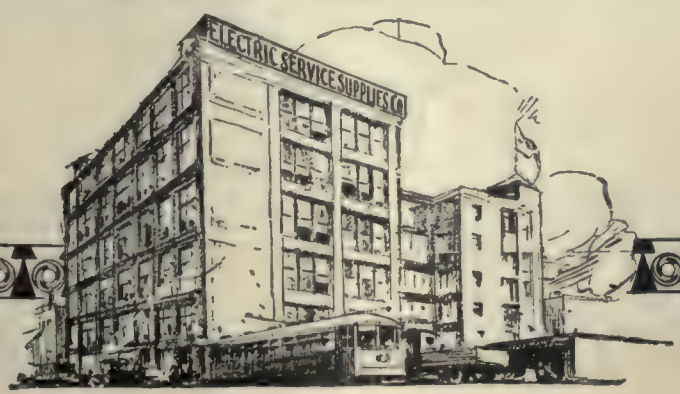
NEW YORK
50 Church St.

SCRANTON
316 N. Washington Ave.

CHICAGO
Monadnock Bldg.

BOSTON
88 Broad St.

Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver



# TIMKEN




## GASOLINE PULLMANS

The motor-coach ushers in the new era of highway transportation.

In its most modern development it offers the traveler an astonishing comfort, convenience and safety at a price within reach of all.

It is a new outlet for the small town, a new feeder for steam or electric railways, a new builder of cities—a creator of traffic where no traffic was before.

The motor-coach is one of the great achievements of the automotive industry, with its own engineering problems, not the least of which concern the main supports of safety, power and economy—the axles. The most progressive builders have turned naturally to Timken Axles, knowing that Timken has anticipated this latest development, as it has so many of the past developments of passenger car, motor truck, taxicab and other automotive vehicles.

THE TIMKEN-DETROIT AXLE COMPANY, DETROIT, MICH.

# AXLES

# A Monogram of Safety

"National Pneumatic" Products are backed up by years of experience in the building of reliable, durable, proved equipment.

"National Pneumatic" Equipment includes door engines, door and step control operating mechanisms, and motormen's signal lights. All time-savers, all efficiency makers and what is most important—*safety builders*.

Increase the *safety* of your equipment by the use of "National Pneumatic" Equipment.

**National Pneumatic Co., Inc.**

*Originators and Manufacturers*

***Executive Office:* 50 Church Street, New York**

Philadelphia—1010 Colonial Trust Building Chicago—940 McCormick Building

General Works—Rahway, New Jersey

*Manufactured in Canada by Dominion Wheel & Foundry Co., Ltd., Toronto, Ont.*





# Where *Bus* and



## "Bus Operating Practice" a book you should have

With buses playing such an important part in modern transportation, the need has been vital for a complete engineering, legal and operating reference treatise to answer a thousand and one questions which continually arise.

Mack is in a position to supply this need with a 250-page illustrated manual. It has remained for Mack to thoroughly canvass the field, enlist the services of specialists in different phases of bus operating practice and assemble this information, complete for the first time between book covers. A copy should be part of your working reference library. Get in your request.

# Street Car coordinate

DECATUR, ILL., is a hustling city of about 45,000 people.

Decatur has a street car line of 17.7 miles. The 11.9 miles of bus routes which were added gives the city *complete service* covering 29.6 miles.

Both the buses and the street cars run to the business center of the city at Lincoln Square. The buses are not used simply as feeders, but where the bus and street car meet, transfer privileges are made easy and convenient.

C. A. Wait, writing in "Current Topics" published in the interest of the employees of the Illinois Power & Light Corporation, says:

"Whether or not the bus service is making a profit remains to be figured out, but it has increased the patronage on the street cars and produced its own direct revenue. That much is certain. To the citizens of Decatur, the addition of the buses with transfer privileges to the street cars seems to be the solution of the transportation problem in the small city".

Mack buses are playing their part in Decatur to co-ordinate bus and railway, just as they are co-ordinating bus and railway for many railway properties. They are distinguished by features which assure greatest economies in daily operation and maintenance costs. For example—

The sturdy long-life Mack engine.

A specially designed low bus chassis.

Wide front axle, assuring safety and permitting a short turning radius.

The Mack dual reduction drive axle especially designed to give maximum road and under-body clearance.

The Mack transmission with ground gears.

The Mack shock insulator feature which provides that all spring ends are embedded in rubber Shock Insulator cushions, eliminating metallic contact between springs and frame, absorbing vibrations, affording yielding support to springs and banishing shackle wear rattles and lubrication.

The Mack Street Car Body.

From bumper to tail-light the Mack is all bus.

MACK TRUCKS, INC.

INTERNATIONAL MOTOR COMPANY

25 Broadway New York City

Eighty-three direct MACK factory branches operate under the titles of: "MACK MOTOR TRUCK COMPANY" AND "MACK INTERNATIONAL MOTOR TRUCK CORPORATION"

# The Mack Bus



25 Passenger, City Type

*Performance counts!*




The program from
STATION CCH
is HEATERS

This is station CCH, the Consolidated Car Heating Company, broadcasting its weekly message to the electric railway industry, direct from its factory at Albany.

# Completeness of Line

The feature on the program this week concerns *completeness of line*. Consolidated Electric Car Heaters are built in types and sizes suitable for every possible condition of service—

Cross Seat Heaters
Truss Plank Heaters
Panel Heaters
Cab Heaters
Electric Blower Heaters

In addition to the heaters for the standard electric railway voltage, 550v.—600v., the Consolidated line includes suitable types for 1200v., 1500v. and 1800v. systems.

Regardless of how exacting may be your requirements, you will find among these types and various sizes the proper heater for meeting *your* particular service conditions. With Consolidated Thermostat Control and Consolidated Electric Car Heaters, your car heating system will be complete. **26 different types of Consolidated Electric Car Heaters have been inspected and approved by the Underwriters Laboratories maintained by the National Board of Fire Underwriters.**

Think of Car Heaters and the name Consolidated comes automatically to mind.

Station CCH now signing off until next week, when it will broadcast another message.

Good Day!

CONSOLIDATED
HEATERS




CONSOLIDATED CAR HEATING COMPANY
ALBANY

New York Chicago

# Galena Oils and Service



## From power plant to cars

Wherever a wheel turns, wherever a surface rubs, wherever there's friction to fight in electric railway operation —there's where Galena Lubrication Service fits.

Note the completeness of this list—

| | |
|---|---|
| Electric Car Oil | Anti-Friction Triple Valve Oil |
| Power House Engine Oil | Air Brake Compound |
| Power House Valve Oil | Gear Greases |
| Turbine Oils | Ball Bearing Grease |
| Dynamo Oils | Roller Bearing Grease |
| Air Compressor Oils | Motor Grease |
| Track Oil | Trolley Grease |
| Gas Engine Oil | Solidified Oil |
| Commutator Oil | Lubricating Grease |
| Electric Generator Oil | Sponge Grease |

## Galena-Signal Oil Company

New York • Franklin, Pa. • Chicago

• and offices in principal cities •



*Comparison of full-size template and pinions after 147,000 miles*

# 147,000 Miles

## in city service on GE-264 Motors

## and good for as much more

Mileage figures alone are not conclusive evidence of quality in railway gears and pinions. When taken in consideration with all the operating conditions, however, mileage becomes significant.

Here is a case of 13-tooth, 4¼-pitch, Grade M Pinions operating on GE-264 (25-h.p.) Motors in city service. They were inspected after 147,000 miles and found to be only half worn out.

Railway men familiar with the factors that determine gear and pinion mileage will appreciate the significance of such a record.

**General Electric Company**
Schenectady, N. Y.
Sales Offices in all Large Cities

40-132

# GENERAL ELECTRIC

New York, Saturday, November 29, 1924

# Electric Railway Journal

*Consolidation of Street Railway Journal and Electric Railway Review*
Published by McGraw-Hill Company, Inc.
HENRY W. BLAKE and HARRY L. BROWN, *Editors*

*Volume 64*
*Number 22*

## Separate Accounts Desirable for Combined Utilities

A TENDENCY has been in evidence in some quarters for railway men to rejoice in the fact that their particular companies were financially associated with and under the same general management as electric light and power companies. The reason for taking satisfaction in this arrangement was the idea that the electric light company would probably make a big profit and could make good whatever losses the railway might incur. A safeguard of this kind may have merit in the eyes of those engaged in marketing the railway securities. It is generally admitted, however, that such a combination, where the profitable department carries the unprofitable one, is unsound as an economic proposition. Aside from that fact, there are also practical difficulties which are sometimes overlooked.

It is very difficult to imbue the employees of a railway associated with a lighting company with the idea that they must unceasingly try for efficient operation. Their attitude seems to be that the electric company will foot the bill and they need not worry. In numerous cases combined railway and electric companies are more careless and slipshod in their methods than are the railways which must depend exclusively on their own resources.

Where a combination of utilities exists under one management, best results come with separate books for the individual services. Not only is this advisable for executive purposes, but the individual figures are available for use in advising both the employees and the public of the earnings status of each utility.

## Depreciation Is Real and Must Be Recognized

THE brief on the subject of depreciation submitted some time ago in behalf of the steam railroads in their case before the Interstate Commerce Commission shows a studied effort to prepare an argument to avoid setting up depreciation funds. This was made on purely legal grounds without giving sufficient weight to engineering facts. The argument is that the average American trunk line is so large and so diversified that any depreciation that may have accrued is balanced by new construction. In other words, they claim the net result is that there is no depreciation. This does not square with the position taken by the American Electric Railway Association that a reserve for depreciation should be set up.

As a matter of fact, depreciation is something that does exist. A locomotive that has seen service for 30 years cannot be as good as ever, regardless of the quality of repair work done on it. Maybe it will function well enough to haul trains, but it is not the machine that it was when purchased. No amount of repair, be it ever so good, will suffice to put it in that condition.

Then there is the question of adequacy. This is so closely bound up with depreciation that it is difficult to separate the two. There comes a time when it no longer pays to patch up the old machine, because there is available on the market something that will do the work so much better that it is folly to spend the money necessary to keep the old machine in working order. The old machine may be "in 100 per cent condition" today, as the steam road brief argues, but actually it is a 100 per cent machine as of 30 years ago.

It naturally is impossible to determine with mathematical accuracy the date on which a certain piece of apparatus will reach the point where it will fail to do the work and must be replaced. Any allowance to cover such reduction in value as will accrue from the action of time, wear and the elements must be made very roughly approximate. Certainly it is possible to show examples of equipment that, through careful repair, have been able to give service over a long period of years. On the other hand, other equipment will wear out very quickly, or will be involved in accidents which will shorten its life materially. To get at the proper accruals for depreciation is quite similar to the calculation of life insurance rates. The amount to be set aside for the individual element is taken from the average of a large number of such units. Enough information is available to enable an accountant to determine the proper accruals for depreciation of the average car, locomotive or piece of track.

On a large property the amount of new construction may offset the amount of depreciation, but unless the cost of the new work is charged to operation rather than to capital it does not cancel the depreciation.

## What the "Automobile Guest" Does to the Electric Railway

THE New Orleans *Times Picayune*, in a recent issue, disagrees with an electric railway statement that automobile drivers are too generous when they invite neighbors to accompany them to and from town and thereby deprive the railway of customers. This newspaper declares that the host in this case would not extend such an invitation unless he expected to gain by it—the usual motive being companionship for the ride—and that it would be an economic waste for such an automobile owner to use a car suitable to carry five or more persons for the transportation of but one. Hence, both driver and guest benefit.

No one will deny that the automobile owner is within his rights when he invites his neighbor to ride with

him. Unfortunately it is also a fact that an electric railway in a community cannot continue to give good service unless it receives sufficient patronage. Possibly the existence of such a line in their community is a matter of indifference to the automobile owner and guests in question. But the continuance of trolley service for the remainder of the community is of real concern to them. Without it they would find the business of their town, including their own, stagnated. Their servants and the tradesmen and workmen who serve them would not be able to reach their places of employment. The great bulk of the buyers would not be able to get back and forth to the stores. So it is true that even the man who provides his own transportation has good reason to avoid a practice which, if multiplied enough times in a community, will impair continuance of the public transportation system.

Another point raised in the editorial mentioned is the economic waste of operating a large automobile for the transportation of one person only. This point is well taken, but if the automobile owner accepts this view, there is hope he will soon realize that it is almost as much an economic waste to operate his automobile for the conveyance of two or three persons, and that in most circumstances he and his friends will save money (and often time) by riding in the trolley rather than in a private car. This has not always been the case in the past, but with more stringent parking regulations it will become more true in the future. The private automobile has its important place in the daily life of the American family, but usually its place is not that of a vehicle to take the owner to and from his daily work.

## Pruning Off the Dead Branches Has Strengthened the Tree

BETWEEN 1917 and the end of 1923 service was suspended on more than 400 miles of electric railway track in Massachusetts, mostly in the eastern part of the state. Since the beginning of 1924 there have been additional, but less extensive, abandonments. No public transportation of any kind is furnished over some of the abandoned routes, but in most cases buses are now running where cars formerly were operated. The opinion is held among electric railway men in this territory, however, that the replacement of rail lines by bus lines has gone about as far as it is likely to go.

Suspension of service on these many miles of track was the natural outcome of an unduly optimistic program of railway building a generation ago. This fever ran even higher in Massachusetts than it did elsewhere. Instead of being content with the construction of one rail line between important points, promoters built two and three. As a result the service and traffic were divided. Other lines were built through such sparsely settled territories that they were never profitable. The advent of the passenger automobile which retarded the natural growth of railway traffic, and the era of high costs prevailing since the war, made the operation of these routes a heavy burden.

Now, however, most of the unprofitable lines which duplicated the service supplied on other routes, or which ran through "no man's land," have been lopped off. This pruning process has undoubtedly strengthened the railway systems, and the lines that remain are now on a sound basis. In the main, they are earning a fair return and it appears unlikely that any considerable additional mileage will be abandoned or replaced with buses in this state.

That is not to say, however, that bus transportation in this territory has reached the limit of its development. Buses are being used more and more on feeder and cross-route lines and to furnish express service. An example of the latter is the Boston and Lowell route operated by the Eastern Massachusetts Street Railway. The Boston & Worcester Street Railway is considering the establishment of a similar service between those cities. The Boston Elevated Railway is already operating a number of feeder bus lines and is considering others. In New Bedford the Union Street Railway operates buses through districts not served by its cars. Further developments of this kind may be expected, even though the railways continue to operate cars, on most of the present track.

## The New Standard of Comparison Sets Requirements Higher for Public Vehicles

AT A RECENT sectional association convention a master mechanic described in detail how the operating and mechanical departments on his road co-operated so that the attention of maintenance men would be directed to rattling sash or squeaking bodies on the buses operated by the railway. He elaborated on the importance of eliminating such squeaks and rattles from the standpoint of pleasing the patrons of the line.

Now this master mechanic was undoubtedly right. He knew from experience what an annoyance a squeak or rattle in a private automobile produces. It was the sales value of quiet operation that stimulated the development of the passenger automobile from an extremely noisy vehicle to its present almost noiseless operation. This development took place in the face of severe inherent difficulties. The sales value of quietness, however, furnished the necessary stimulus to carry out the improvement in the face of the difficulties. The master mechanic appreciated the sales value of quietness in his buses because of their direct outgrowth from the automobile, because he and his passengers apply the standards of automobile comfort in judging the comfort of his buses.

But how many railway men are fully aware that railway passengers are also judging the comfort of a railway ride by automobile standards? No wonder we hear much these days of "the rubber urge" and "the desire to ride on rubber." That desire is largely a desire to ride quietly. Although operation on steel rails imbedded in concrete presents many complications from the standpoint of quiet operation, surely an application of the painstaking care described by this master mechanic in connection with the maintenance of buses would also produce improved conditions on railway cars. Tight sash and the elimination of body and truck squeaks and rattles would make the average electric railway car a more pleasant and desirable vehicle in which to ride.

It is entirely a matter of viewpoint. It is easy to appreciate the importance of quiet operation of a bus. The same sales value also attaches to the same factor in railway cars. Surely more careful attention to these squeaks and rattles would work a substantial improvement, pending further development of body and truck construction with a view toward quiet operation.



Buses and Cars Are Now Operated in Co-ordinated Service in Decatur, Ill.

# Buses Amplify Transportation in Decatur, Ill.

**Unified Car-Bus System Gives Transportation Service to Illinois City of 45,000—Fifteen Modern Buses Supplement Street Cars with Free Transfer Privileges—Transfer House in Center of Business District Is Starting Point for All Cars and Buses**

SINCE the inauguration of bus operation in Decatur on Aug. 1, 1924, by the Illinois Power & Light Corporation, this city of 45,000 population has had unified and co-ordinated transportation system. All arts of the city are served at a single fare and free ransfers are issued between cars and buses. For a ıort distance from the center of the city cars and uses operate over the same street, but the routes soon iverge. A number of the bus routes serve sections f the city not conveniently provided with railway facilies, while others supplement the service in districts lready reached by the street cars.

The history of the transportation situation in ecatur is not unlike that of a number of other cities here the public has underestimated the value to it of ıe street railway and has allowed competition to run iot. Since 1920 independent bus operation has develped with great rapidity on a 5-cent fare, while the ailway fare was 6 cents or 9 tickets for 50 cents. The ity administration has endeavored to make political apital of the difference in fare. The buses prospered, nd while they did not operate entirely on the same treets as the railway, the effect of the added transortation service was felt by the company.

After these conditions had continued for three years ıe railway undertook an extensive investigation of the ntire transportation problem in Decatur. A consulting ngineer was called in and he submitted a report to ıe management and to the City Council. Among the ıggestions embodied in his report was one to the effect ıat the railway should operate buses as auxiliaries and eders.

Following out this suggestion the railway procured rom the Illinois Commerce Commission a certificate of convenience and necessity for operating buses. This was done with the definite understanding that the competitive lines would be purchased before operation was started. Negotiations between the railway and the independent bus operators resulted in the latter obtaining fair prices, considering the depreciated value of the equipment and an additional amount for good will. The railway management believes that legal action to end the competition would have been unpopular with the people of the city, as would have been the inauguration of competitive bus service.

The new equipment purchased consisted of 10 Model Z 29-passenger Yellow Coach Company's buses and 5 Mack 25-passenger buses. These vehicles represent an expenditure of $120,000. They are painted according to the company's standard color scheme of yellow and orange. The seal of the railway appears on the letterboard. In the interior no hand straps have been provided, although it is customary at times to carry standees. Fare collection is accomplished by means of a Woods farebox.

A number of the former independent operators have been taken into the employ of the railway. These men were carefully trained in the operation of the new equipment and with a few exceptions have proved satisfactory. The remaining bus drivers were secured from outside except two men who transferred from the car service. The uniform worn by the bus drivers is made of Oxford gray whipcord with breeches and leather leggings.

All bus and car routes start from the transfer house in the central square. This terminal serves as a hub for the co-ordinated transportation system and is a convenient place for transfer between bus and car. Six



A Modern Garage with 16,000 Sq.Ft. of Floor Space Has Been Built to House the Buses

bus routes have loading zones along the curb opposite the transfer house. Loading points are designated by signs and the police department keeps this area free from parked automobiles.

Bus lines intersect the street car lines only in the center of the city and transfers are issued between the two only at the transfer house, as the bus routing is such that transfers at other points are not needed. All bus routes are comparatively short, the longest being that to Nelson Park, a distance of 2.72 miles. The present arrangement of bus and car routes is shown in the accompanying map. The total route mileage of the buses is 11.44. The base schedule calls for 10 buses and the running time is 10 m.p.h., as compared with a schedule speed of 8 m.p.h. under independent operation. All routes with the exception of the Nelson Park line operate over paved streets. This line is operated over a gravel road from the city limits to the park, but as the road is in fair condition, the buses experience no difficulty. Nelson Park is an attraction on Saturday evenings and Sundays. The base schedule, which is normally handled by one bus covering the route every 30 minutes, is augmented by five additional vehicles during the peak periods on Saturday afternoons and Sundays. Often a bus is called upon to carry as many as 65 passengers to or from the park. While such heavy traffic might be handled more economically by street cars, the overloading is of short duration, and the normal traffic during the week is handled easily by one 29-passenger bus.

Routes, number of vehicles and running time are shown in the accompanying table.

The street car system consists of a total of 15.75 miles of route covered by 25 cars the majority of which are single-truck safety cars. Headways vary from 10 to 20 minutes. Most of the lines are single track with turnouts.

During the first month the buses operated by the railway carried an average of 9,000 passengers per day,

| No. | Name | Round Trip Miles | Base Vehicles | Round Trip Time, Minutes | Scheduled Headway Minutes |
|---|---|---|---|---|---|
| 1 | Franklin | 2.23 | 1 | 15 | 15 |
| 2 | East Main | 2.42 | 2 | 20 | 10 |
| 3 | Nelson Park | 5.44 | 1 | 30 | 30 |
| 4 | North Jasper | 3.73 | 2 | 24 | 12 |
| 5 | North Monroe | 4.62 | 2 | 30 | 15 |
| 6 | West Decatur | 3.44 | 2 | 20 | 10 |

a notable increase over the average number carried by the former independent operators. In the opinion of the management this increase was due to the more comfortable and attractive vehicles operated and to the co-ordinated service. At the same time the street cars also showed an increase in the number of passengers carried.

To give the new service a favorable start full-page advertisements announcing the plan were published in the local newspapers. Later advertisements were used to announce the actual beginning of bus operation and to familiarize the people with the routes and the rates of fare. While the present fare of 6 cents cash or 9 tickets for 50 cents is a slight increase over the



The Storage Space Outside the Garage Is Equal in Area to that Inside



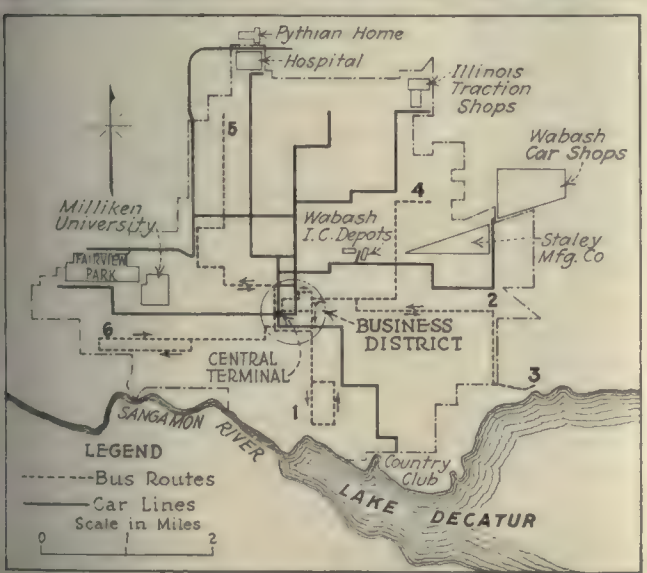
Loading Spaces Have Been Provided by the City at Various Points Along the Curb at the Central Square

-cent fare formerly charged, no complaints have been eceived.

A new garage costing $60,000 was built for the buses n property adjacent to the railway carhouse. This uilding is 200 ft. long and 80 ft. wide and is so situated hat entrance can be had through a door at the south nd, while egress from the building is by nine double winging doors on the east side. The garage has been ocated upon a triangular piece of property in such a ay that it has been possible to pave the remainder f the land, thus affording a large amount of outside torage space. In order to make a convenient approach o the property, 300 ft. of street was paved and at the ame time one-half of the width of the street on the ast side of the property was paved to afford an exit. Property owners along this street paid for the paving or the other half.

Red brick with white limestone trimmings was used or the building. A single span arch roof is carried n steel trusses spaced at 20-ft. centers. The curve f the roof has been carried out in the construction of he end wall, giving the building a pleasing appearance. The east wall consists of the nine double doors already nentioned. On the west, 60 per cent of the wall space s taken by windows with small panes set in steel rames.

The interior of the garage is open for almost its ntire length. The last bay at the north end is occupied y an office, stockroom, locker room and toilet. Fuel for he buses is stored in two 1,000-gal. tanks buried utside the building. The washrack is immediately in- ide of the entrance door at the south end. This rack




**Routes of the Co-ordinated Bus and Car Service in Decatur**
1—Franklin; 2—East Main; 3—Nelson Park; 4—North Jasper; 5—North Monroe; 6—West Decatur.

drains into a trough 14 in. wide and 12 in. deep, covered with steel grating and connected with the sewer. Swivel pipe connections and hose and washing utensils are mounted on two of the overhead trusses.

Two inspection pits 3 ft. 4 in. wide x 4 ft. 3 in. deep and 18 ft. long are located near the north end of the building. These are covered with removable gratings made up in sections 1 ft. long. Near these pits are located the work benches, test racks and battery charging outfits. No machine tools are in the garage because the railway machine shop is adjacent. The garage is heated by hot air forced over steam pipes and delivered through ducts at a pressure of about 5 in. of water. Inasmuch as the garage will be used mostly at night, ample illumination has been provided by means of three 100-watt shaded lamps on each roof truss. A similar shaded lamp is mounted above each doorway outside the building.

The plan is to have the buses fueled outside, washed immediately after entering the building and then stored in a double row, starting at the north end and facing



**Interior of the Garage at Decatur, Showing the Inspection Pits**

toward the side with the doors. With this arrangement it is possible to accommodate conveniently 30 buses and an equal number can be parked outside. When the buses pull out in the morning no backing or turning will be necessary inside the garage, but the vehicles can move straight ahead through the double doors. In an emergency all doors can be opened and the buses pushed out by hand, this being possible because there is a slight grade to the land surrounding the building. The doorways and roof trusses have a clearance of 14 ft. 6 in., which is sufficient to permit the passage of a double-deck bus.

## Detroit Car Cards

THE following are copies of car cards or bulletins used by the Department of Street Railways in Detroit during the past few weeks:

Cross Car Tracks Cautiously! Leaves Falling on the Track Cause Slippery Rails and Prevent Quick Stops.

*Street Space.*—"There is sufficient space in the average street to take care of two lines of traffic comfortably or three lines in emergency. When cars are parked against the curb on both sides, the available space will be sufficient for only one line of traffic. It is inevitable that congestion and delays must follow."—*Dominick Henry, Deputy Chief Inspector in charge of New York traffic.*

*Lost Articles*—During the month of September, 1,611 articles were left on the cars of this system. All articles found on D.S.R. cars are sent to the Lost Article Department, which is located at Room 328, 165 Congress Street. If you lose or think you might have left an article on a street car, inquire at the above address, or call Cadillac 2551. This information is given for your convenience and to forestall the ever-increasing number of calls, both personal and telephone, to the various carhouses in regard to lost articles.

Awaiting Common Council Action! D.S.R. is preparing to furnish new motor bus service as soon as a purchase contract is approved. Service will operate to unserved outlying districts direct from the business centers. Six-cylinder pneumatic tires, fully inclosed upper deck. We want the best vehicles—made in Detroit if possible—but the best at any cost.

# Changing a Deficit Into a Profit*

**In Four Years the Charleston Consolidated Railway & Lighting Company Has Reduced Its Operating Expenses per Car-Mile 35 per Cent, While Its Gross Earnings Decreased Approximately 30 per Cent**

HOW to operate the street railway in Charleston, S. C., and make both ends meet has been a problem ever since the World War. In 1920 the population served by the Charleston Consolidated Railway & Lighting Company was approximately 84,000. The next year it had dropped to 78,000. In 1922 it was 72,000, in 1923 it was 66,000, and at the present time it is estimated to be only 58,000. In the face of these conditions it was inevitable that the earnings of the railway should decrease. The reduction in revenue per car-mile from 43.17 cents in 1920 to 29.95 in 1924, a decrease of approximately 30 per cent, is, in fact, slightly less than the per cent decrease in population of the city.

ORGANIZATION OF RAILWAY DEPARTMENT

| | July, 1923 | January, 1924 | July, 1924 |
|---|---|---|---|
| Railway | | | |
| Superintendent | 1 | 1 | 1 |
| Clerks | 2 | 2 | 1½ |
| Claim Department | | | |
| Adjuster | 1 | 1 | 1 |
| Investigator | 1 | | |
| Clerk | 1 | 1 | ½ |
| Transportation Department | | | |
| Supervisor | 1 | 1 | |
| Dispatcher | | | 1 |
| Receivers | 2 | 2 | 2 |
| Inspectors | 5 | 5 | 4 |
| Trainmen | 140 | 108 | 90 |
| Mechanical Department | | | |
| Master mechanic | 1 | 1 | |
| General foreman | | | 1 |
| Electrical foreman | 1 | 1 | 1 |
| Electrical workmen | 5 | 2 | 1 |
| Machine shop foreman | 1 | 1 | 1 |
| Machine shop workmen | | | |
| Air-brake foreman | 1 | 1 | 1 |
| Air-brake workmen | 5 | 2 | 1 |
| Paint shop foreman | 1 | 1 | 1 |
| Paint shop workmen | 2 | 2 | 1 |
| Carpenter foreman | 1 | 1 | 1 |
| Carpenter workmen | 8 | 4 | 2 |
| Carhouse foreman | 1 | 1 | 1 |
| Carhouse workmen | 23 | 19 | 18 |
| Night foreman | 1 | 1 | 1 |
| Night workmen | 11 | 8 | 6 |
| Total | 220 | 166 | 141 |

To meet this situation the railway has had to curtail its expenses heavily. This has been done by the inauguration of one-man operation, reducing the number of men employed in the shops, and by reducing the number of car-miles operated. An important saving has also been made in the amount paid for damage claims.

In 1923 the percentage of one-man cars operated to total cars was 51.3, while in 1924 the percentage of one-man cars was 91.3 of the whole. This has made it possible to reduce the number of trainmen from 140 to 90. At the same time radical revisions have been made in the supervisory force and the personnel of the mechanical department. Details of these changes are given in an accompanying table.

The results have been to reduce purely transportation costs per month approximately 20 cents per car-mile down to about 11 cents per car-mile. During the same period the maintenance of equipment has been reduced from 5 cents per car-mile to about 3 cents. In the first six months of 1923 $26,402 was paid in claims. In the same period of 1924 the amount was $6,810. The combined results of these savings has been to convert a deficit of $4,796.70 for June, 1923, into a profit of $4,209.41 for June, 1924.

| Classifications | June, 1920 | June, 1921 | June, 1922 | June, 1923 | January, 1924 | June, 1924 |
|---|---|---|---|---|---|---|
| Gross earnings | $76,849 46 | $66,234 13 | $53,429 62 | $45,126 65 | $36,426 47 | $35,745 68 |
| Operating expenses including taxes | $72,692 42 | $60,330 40 | $53,420 99 | $49,923 35 | $35,361 67 | $31,536 27 |
| Net income from operations | $4,157 04 | $5,903 73 | $8 63 | $4,796 70* | $1,064 80 | $4,209 41 |
| Gross earnings per car-mile, cents | 43 17 | 39 38 | 35 52 | 31 16 | 29 58 | 29 95 |
| Operating expenses per car-mile, cents | 40 84 | 35 87 | 35 51 | 34 47 | 28 72 | 26 42 |
| Income from operation per car-mile, cents | 2 33 | 3 51 | 01 | 3 31* | 86 | 3 53 |
| Per cent operating expenses to gross | 94 59 | 91 09 | 99 98 | 110 63 | 97 08 | 88 22 |

* Deficit.

*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

# Oklahoma City Enlarges Passenger Station

**This Station, Built in 1911, Had Become Outgrown and Has Just Been Enlarged—It Now Has Six Through Tracks—A New Freight Station Has Also Been Built**

THE Oklahoma Railway recently completed the rearranging and separation of its passenger and freight terminal facilities in Oklahoma City. The old passenger terminal station, which was constructed in 1911, had become inadequate for the volume of traffic passing through it. This was particularly true during the morning and evening rush hours and with the advent of the small one-man safety cars.

In the original layout, the freight station was located just west of and adjoining the passenger station and was served by two short tracks entering from Hudson Street. These two tracks were laid out with short radius curves and would not take all standard equipment. No provision was made for teaming, as the trackage allowed the loading of package freight cars only from the dock. Baggage and express shipments were handled in a small building on the west side of the passenger terminal inclosure.

The original passenger terminal contained two through tracks from Main Street to Grand Avenue, two passing tracks out of these through tracks, and four stub sidings for car storage.

The city and interurban cars were routed to enter the terminal from both directions, and the two outside tracks were reserved for interurban traffic. This condition caused more or less trouble because, when two interurban cars were in and loading, only the two through tracks were available for the city cars.

In the new layout there are six through tracks in the passenger terminal, as shown in the plan. The city cars use the four easterly tracks and the interurban cars the fifth and sixth tracks. All traffic through the new terminal is one way, all cars entering from Grand Avenue. There is also a stub siding, leading off from the sixth track, for the storage of interurban trailers. There is dock room and team space on the west side of the sixth track to provide for the minimum of handling between truck and car.





At Left, New Passenger Terminal Under Construction. At Right, Team Side of New Freight House

All the new special trackwork on Grand Avenue, made necessary by these changes, is laid with wood ties and ballast, while all tracks, including special work within the terminal inclosure, are on steel ties, Carnegie H section, with a reinforced-concrete beam under each rail. Paving brick was placed outside the rail for a border, and one row of brick was placed inside the rail to provide for the flangeway. The old train shed was divided into two sections, and these two sections were placed alongside each other, thus providing overhead protection for the entire six tracks.

A 4-in. slab of concrete was poured alongside the tracks for platform space.

Concrete pits were installed at the south end of the terminal and just inside the north property line on Grand Avenue. These pits are to be kept filled with water and are illuminated at night with a series of red lights to keep trespassers out.

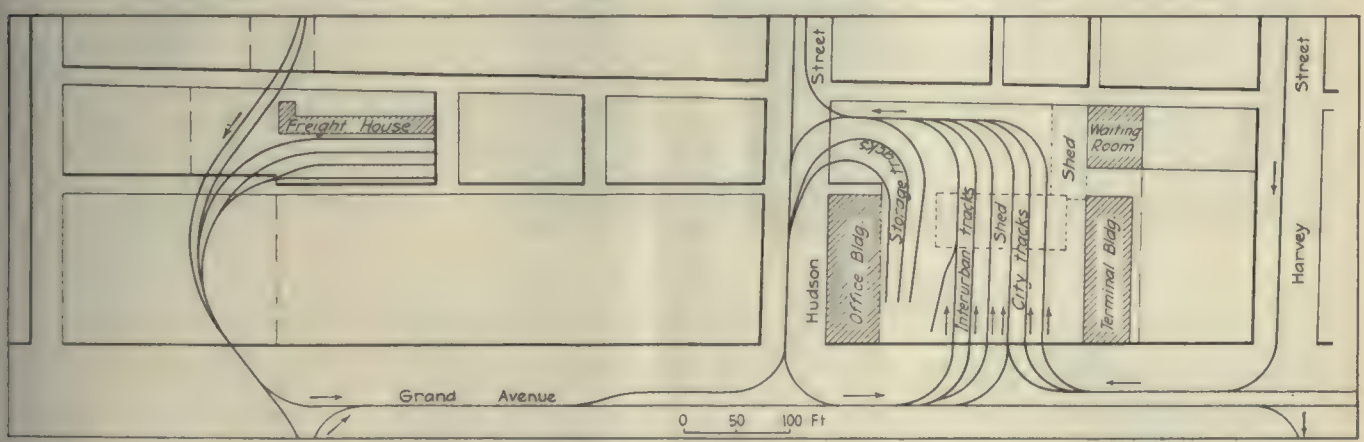
The tracks shown in the plan as entering the terminal from Hudson Street on the west side formerly served the old freight terminal. These tracks, later, are to be lengthened and used for storage tracks.

Several electric track switches have been installed. One is at the turnout to the interurban tracks on Grand Avenue, one at the wye just off Hudson Street at the west side of the terminal yard, and one at the wye at Main and Hudson Streets. Some additional track had also to be built to route the cars one way through the terminal. No change has been made in the method of handling passengers into and out of the terminal inclosure.

### A New Freight House Built

The new freight house is located one block west of the passenger station and is served by one through track from Main Street to Grand Avenue and one passing track.

The freight dock is 20 ft. x 130 ft. and has 80 ft. under roof. The driveways to the dock and team tracks are ballasted with crushed rock, the rock being covered with limestone screenings and the screenings with crude oil to give a good surface and to keep down the dust. Freight offices and a warehouse were constructed at the west end of the freight dock. The alleys on both




Plan Showing New Station Layout, Oklahoma City





Arrangement of Pits and Red Lights to Prevent Unauthorized Entrance to Passenger Terminal from Street

sides of the freight station are paved with brick, which makes the dock accessible in all kinds of weather.

All labor on the passenger and freight stations was done with company forces. With the exception of the special work layout at the north end of the passenger terminal, which was purchased new, the special work required was taken from material on hand and assembled for the various locations.

## Replacing Cable on the Mount Lowe Incline

THE replacement of the pulling cable on the Mount Lowe Incline, a 62-deg. grade between Rubio and Echo Mountain on the Pacific Electric Railway scenic route in southern California, was accomplished some time ago by the mechanical department of the company. On account of the grade and unique physical conditions existing the replacement of this cable was a difficult engineering feat. This route was constructed in 1893 and has been operated since that time by the Pacific Electric Railway. Two passenger cars are operated on this incline to convey sightseers to Alpine Tavern, a mile up the mountain.

The pulling cable on the incline is 3,000 ft. in length and weighs more than 6 tons. It is replaced at intervals ranging from two to three years, its condition being determined by hand inspection and examination over its entire length every week. Extensive preparations, considerable equipment and a trained crew of 12 mechanics are required to make the change. A 35-hp. motor is used to drive a revolving cable reel capable of receiving the entire 6 tons of discarded cable. The motor and reel, together with the reel containing the new cable, are mounted on a flat car anchored at the foot of the incline, as shown in an accompanying illustration.

The cable is in the form of a loop, the section ahead of the car being known as the "pulling cable" because it carries the load. The section behind the car is known as the compensating cable because its only function is to take up the slack. When preliminaries have been completed the pulling cable is cut with an acetylene torch at a point about 60 ft. behind the lower car. The new cable is then spliced into the old pulling cable. The cars are chained into position on the incline before the pulling clamps are removed. The end of the compensating cable is made fast to the power-driven reel, which is started simultaneously with the cable winding machinery at the top of the mountain. While the new cable is being pulled into position the old cable is being reeled up. Care must be taken that the speed of the reel coincides with the speed of the winding machinery. The entire length of the incline must be under observation while the change is being made to make sure that the new cable does not jam or leave the guiding pulley.

The job was done under the direction of J. W. Haughton, assistant mechanical superintendent, who has supervised this work since 1909. Several members of the crew have taken part in this work for the past 20 years. In spite of the familiarity of the men with the work it requires about 20 hours before the line is again ready for service.







**Features of Cable Replacement on the Mount Lowe Incline, Pacific Electric Railway**

No. 1. Mechanics make a weekly inspection of the cable, using a special sled.

No. 2. A motor-driven reel to wind up the old cable and another reel containing the new cable are mounted on a flat car at the foot of the incline.

No. 3. A new cable was recently installed on the Mount Lowe Incline, which rises 1,300 ft. at a 62-deg. grade.

# Modern Planning System in Detroit Shops

**Department of Street Railways Has Developed System for Checking Progress of Work on Cars in Various Departments of Highland Park Shops — Cumulative Curves Give Daily Information on Production**

*By G. L. Ohmart*
General Foreman Highland Park Shops,
Department of Street Railways, Detroit, Mich.

CENTRALIZED planning and production control are necessary for a well-regulated and efficient business. The planning systems in use in the large manufacturing plants have demonstrated their worth over and over again. While the methods employed in planning for a manufacturing plant can be only partially applied to a maintenance shop, the principles involved are the same in both cases.

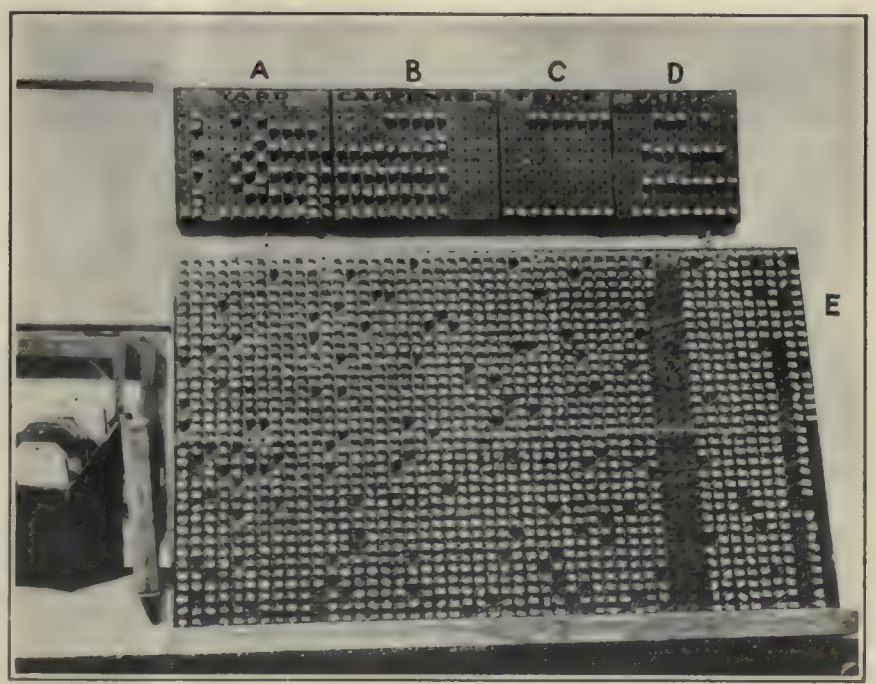
Up to the present time the functions of the planning department in the Highland Park shops of the Detroit Department of Street Railways are confined to the handling of cars from the time they come to the shops until they are taken away, and to keeping such records and charts as have been found useful in carrying out the work. No attempt as yet has been made to do the detailed planning of the work of each shop department, although this is under consideration.

When a car is sent to the shops for any class of work, a form, shown in an accompanying illustration, is filled out by the carhouse foreman with car number, name of the carhouse, and a general notation of the reason for the car being sent in. This card (Form 246) is then turned over to the yard master of the operating department, who fills out the detachable part of the card with the car number, time the car leaves the carhouse, and the badge numbers of the crew which will take the car to the shop. The card is taken to the shops with the car and turned over to the planning clerk, who enters on the detachable part of the card the time the car is received, and signs the card. This stub is then detached and taken back to the yard master. It not only serves as a record of the movement of the car, but also as a receipt of the delivery of the car to the shops and a check on the time the crew arrived.

The planning clerk, who is in touch with all the shop foremen, enters on Form 246 the account numbers for each class of work and a description of the various classes of work to be done, such as wiring changes, overhauling trucks, painting, etc. This card is then fastened to the car to remain until all the work is finished and the car is ready to leave the shop.

### Planning Progress of the Car

When a car is delivered to the shop, it is left in the yard by the train crew. The planning clerk has direct charge of the movement (shifting) of all cars at the shops and also of the men (shifters) who do this work. Assuming that work on the car is to be started in the carpenter shop, Form 247, shown in another illustration, is used to instruct the shifters. This form is made up on green paper in pads 4 in. x 6 in. size. It will be noted that spaces are provided for car number, date, and two series of locations; "from," which indicates present location of the car, and "to," indicating where it is be moved.



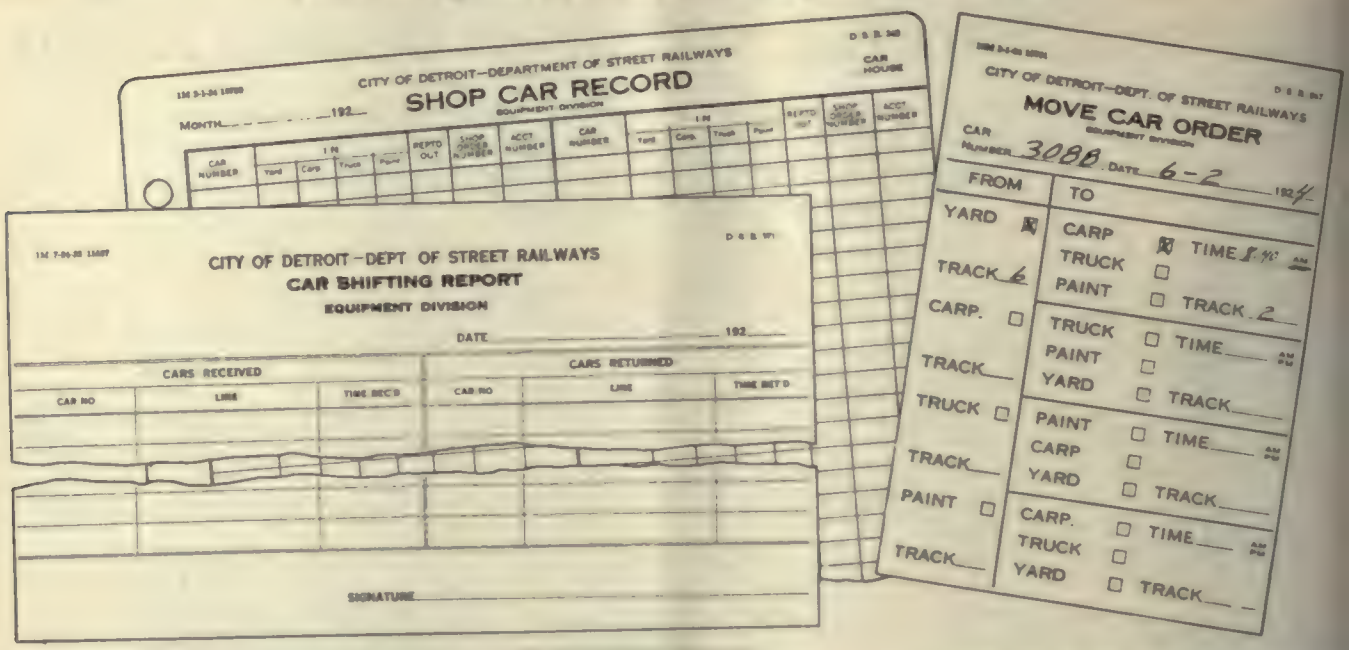

**Car Numbers on Plugs Show Where the Cars Are in the Shops**

Location of all cars in the shop is indicated on the upper plug board. This is divided into four sections to indicate the various departments. The holes in each section correspond with the car locations on each track in that department of the shop. The lower and larger board indicates cars in service at carhouses, and contains plugs arranged in numerical order for quick reference.

Assume that the car is on Track 9 in the yard, and is to be moved to Track 2 in the carpenter shop. Under "From" the planning clerk checks an "X" opposite "yard" and writes in "Track 9." Under column headed "To" he checks "X" opposite "Carp," writes in "Track 2" and gives the time. This form is turned over to one of the shifting crew and furnishes complete information regarding the movement of the car. He delivers the car to the proper track in the carpenter shop and turns over Form 247 to the carpenter foreman. This is notification to the foreman that the car is in his department, at a certain location, ready for work.

When any particular job is completed on a car, the foreman in charge of this work enters in the column headed "Repairs made by" the badge number of the man or men who did the work, and also signs his own initials,

## Forms for Highland Park Shops Give Complete Record of Work




At top (Form 248)—Form used by the planning clerk in connection with his work. This serves as a permanent record of the location of all cars in the shop.

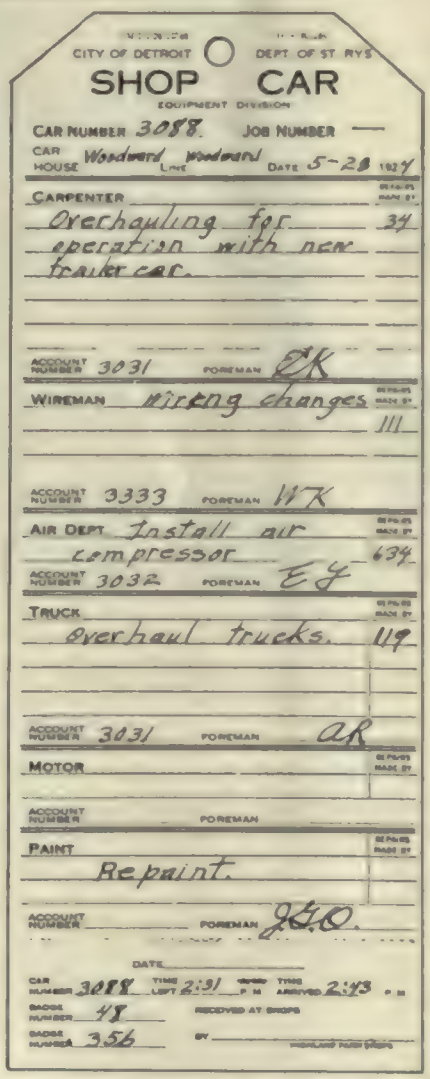
Below (Form 371)—A complete record of all car movements to and from the shop is kept on these daily sheets, which are signed by car crews.

(Form 247)—The planning clerk issues instructions on this form for shifting cars between departments in the shop.

indicating that the work has been completed properly. When all the work to be done by that department is completed on the car the foreman notifies the planning clerk by telephone that it is ready to leave his department, gives its present location and the next department to which it is to be moved. The planning clerk again uses Form 247 to notify one of the shifting crews that this particular car is on Track 2 in the carpenter shop and is to be moved to Track 4 in the truck shop. The shifter moves the car and turns over the form to the truck shop foreman. This procedure is repeated for each movement of the car.

When all the work of the various shop departments is completed, the car goes back to the yard ready to be taken to the carhouse. Form 246 is now removed and filed for future reference, as it gives a complete record of work done, workmen's numbers, job numbers, account numbers to which labor and material were charged, the date, and the foremen's signatures, indicating that the work was carried out properly.

The location of all cars in the shops is indicated on a board in the planning clerk's office by means of plugs having the car numbers stamped on them. The board has a series of holes for each track in the yard and the various shop departments. An accompanying illustration shows the arrangement. It can be seen from this that the upper board is divided into four sections. Section A represents the yard, B the carpenter shop, C the truck shop, and D the paint shop. The large board E, below, holds the plugs for all the cars which are in service at the various carhouses. The plugs in the large board are arranged in numerical order so that it is easy to pick out any particular car number wanted.




(Form 246)—This form indicates the work to be done in each department, the badge numbers of the men, the account chargeable and the signature of the foreman who approved the completed job. The stub at the bottom is sent back to the carhouse as a receipt when the car is delivered to the shop.

Simultaneously with the movement of the car, the plug with that car number on it is moved to the proper place to indicate the location of the car. This part of the system is very useful, both to the planning department and to the executives, who can tell at a glance exactly where a car is located, as well as the number of cars in the different shop departments.

In the case of a car which has been in an accident and on which all costs of repairing due to the accident are kept separate from regular maintenance, a separate job number is issued. Form 245, which is a tag exactly like 246 except that it is red instead of yellow, is used either separately or in conjunction with the latter to give the job number and account numbers on the work done due to the accident. When both regular maintenance work and work due to accident are necessary on a car, both cards are clipped together and placed in the car for the information of the shop men concerned.

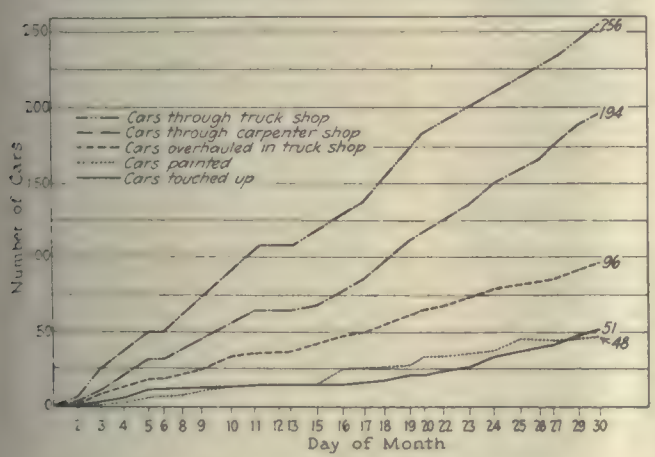
Two other forms are used by the planning department to keep records. Form 371, also shown in an illustra-

tion, is a sign-in and out sheet. All entries on this sheet are made by the crews of the transportation department who take cars to and from the shops, a new sheet being used each day. The operator enters in the proper columns the car number, the line on which the car is operated regularly, and the time it arrives at or leaves the shop, as the case may be.

Form 248 is used by the planning clerk chiefly for his own information in carrying out the details of his work. When a car is received at the shop, the car number is entered in the proper column and the date under "Yard." Then as the car goes through the various shop departments, the date is checked under the proper column when it enters that department. When the car is finished, the date is entered when the car is reported out to the carhouse. There are also columns for shop order and account numbers.

### Production Curves Plotted Monthly

In connection with the planning, a number of progress or production curves are kept daily for periods of a month each. A typical curve sheet is illustrated. These curves are plotted cumulatively so that at the end of any period, beginning with the first of the month, the total is given to date. The abscissas represent the actual number of working days in the month, whole




**Charts Show Daily Production of Each Department**

Cumulative curves are used to record production and show the monthly totals up to any given date. These sheets are made up 9 in. x 12 in., and the various items of production are shown in different colored lines.

days and half days being given proper value. The ordinates give the number of cars. By one subtraction, the production for any other period of time can be obtained. A straight line drawn through zero and the point at the end of any period gives the average daily production. In case there is a definite production to work to for a month, a straight line through zero and the total value for the month represents the actual average amount required per day, and the deviation of the actual production curve from the straight line represents at any time the exact amount that production is ahead of, or behind, the requirements.

At the present time curves are being made up for the following items: Total cars received, total cars out of shops, cars through the carpenter shop, cars through truck shop, cars through paint shop, accident cars through the shops, car wheels welded, car wheels bored, car wheels pressed on, car wheels pressed off, motor gears changed, car wheels turned, car wheels ground, stoves replaced and stoves rebuilt.

Similar curves can be worked out to meet the particular needs of any shop, and may be used to keep daily progress on any kind of shop work. The value of such curves to the shop executives can hardly be overestimated. They furnish him in a moment's time with a simple picture which tells him just what each shop department is doing and enables him to co-ordinate readily the shop work with the requirements.

# The Readers' Forum

## *Sixteen Hundred Butt Welds in Philadelphia*

THE LORAIN STEEL COMPANY
JOHNSTOWN, PA., Nov. 21, 1924.

To the Editors:

In the article on "Rapid Track Reconstruction with Butt-Welded Joints," which appeared in the Nov. 15 issue of the ELECTRIC RAILWAY JOURNAL, the statement is made that butt-welded joints were tried in Boston and in Philadelphia, about 500 joints being made in each place. While this is correct as far as Boston is concerned, more than three times this number were made in Philadelphia. To be exact, 1,607 butt welds have been installed in the latter city.

H. F. A. KLEINSCHMIDT,
Superintendent Track Welding Department.

## *Canadian Highway Tax Not Discriminatory*

HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO
*Hydro-Electric Railways Operating Department*

TORONTO, ONT., OCT. 31, 1924.

To the Editors:

After commenting on the conditions of electric railway operation in Canada in ELECTRIC RAILWAY JOURNAL for Oct. 25, page 749, you refer to a statement of the *Canadian Financial Post* in the last part of which it is stated that the bus license fee is not an equitable tax inasmuch as it is not on the same basis for all bus lines. The statement also contends that the buses in direct competition with hydro radials are being taxed so high and in such an arbitrary manner as to prevent them giving adequate service. For your information I would say that the tax is imposed by the Department of Provincial Highways and is, according to its statement, the same on all provincial highways, no discrimination being shown in any way against the bus lines operating in opposition to the Hydro-Electric Railways—in fact, it really is to the contrary. The act became effective and was enforced commencing June 1, 1924. We have three lines in competition with buses. On our Scarboro division the tax became effective on June 1; on the Metropolitan division it did not become effective until Sept. 1, while on the Mimico division, where we are affected most, it is not in effect as yet but it is expected that it will become effective on Nov. 15.

This certainly does not show discrimination in favor of the Hydro, and I am satisfied that by calling your attention to this misstatement you will correct the impression that was unwittingly created.

This is the type of propaganda which is being used against the Hydro at all times by those opposed to public ownership.

W. R. ROBERTSON,
General Superintendent.

# American Association News

## Committee Appointments for 1924-1925, American and Engineering Associations

COMMITTEE appointments for the American Electric Railway Association are virtually complete. Appointments to Engineering Association committees are also completed with a few exceptions. The committee membership of the Accountants, Claims and Transportation and Traffic Associations are not yet available. The personnel of the American and Engineering Association committees follows:

### American Association

#### FINANCE

R. P. Stevens, president Republic Railway & Light Company, New York, N. Y., chairman.
B. A. Hegeman, Jr., New York, N. Y.
L. S. Storrs, New Haven, Conn.

#### POLICY

F. R. Coates, president the Toledo, Ottawa Beach & Northern Railway, Toledo, Ohio. Mailing address, H. L. Doherty & Company, New York, N. Y., chairman.
J. G. Barry, Schenectady, N. Y.
Britton I. Budd, Chicago, Ill.
C. D. Emmons, Baltimore, Md.
Harry Reid, Indianapolis, Ind.
W. H. Sawyer, East St. Louis, Ill.
Paul Shoup, San Francisco, Cal.
H. D. Shute, East Pittsburgh, Pa.
R. P. Stevens, New York, N. Y.
L. S. Storrs, New Haven, Conn.
Robert I. Todd, Indianapolis, Ind.

#### NATIONAL RELATIONS

Harry Reid, president Interstate Public Service Company, Inc., Indianapolis, Ind., chairman.
E. J. Bechtel, New York, N. Y.
H. G. Bradlee, Boston, Mass.
Ralph R. Bradley, Chicago, Ill.
Arthur W. Brady, Anderson, Ind.
C. D. Cass, Waterloo, Ia.
Samuel Curwen, Philadelphia, Pa.
F. C. Hamilton, New York, N. Y.
J. H. Hanna, Washington, D. C.
G. H. Harries, Chicago, Ill.
Charles L. Henry, Indianapolis, Ind.
Frank Karr, Los Angeles, Cal.
H. A. Mitchell, Oakland, Cal.
Frank Silliman, Jr., New York, N. Y.
D. W. Snyder, Jr., Springfield, Ill.
A. F. Van Deinse, Marion, Ohio.

#### SUBJECTS AND MEETINGS

W. H. Sawyer, president East St. Louis & Suburban Railway, East St. Louis, Ill., chairman.
H. D. Briggs, Newark, N. J.
Harry L. Brown, New York, N. Y.
F. D. Burpee, Ottawa, Ontario, Canada.
T. C. Cherry, Syracuse, N. Y.
C. H. Clark, Cleveland, Ohio.
Harlow C. Clark, Newark, N. J.
W. L. Davis, Allentown, Pa.
F. W. Doolittle, New York, N. Y.
C. R. Ellicott, New York, N. Y.
J. H. Hanna, Washington, D. C.
G. H. Harries, Chicago, Ill.
C. W. Kellogg, Boston, Mass.
A. S. Richey, Worcester, Mass.
R. B. Stearns, Boston, Mass.
E. F. Wickwire, Mansfield, Ohio.

#### PUBLICITY

James P. Barnes, president Louisville Railway, Louisville, Ky., chairman.
Barron Collier, New York, N. Y., vice-chairman.
W. R. Alberger, Oakland, Cal.
Frank L. Blanchard, New York, N. Y.
J. S. Bleecker, Philadelphia, Pa.
Robert Dougan, Washington, D. C.
P. H. Gadsden, Philadelphia, Pa.
L. E. Gould, Chicago, Ill.
J. P. Griffin, Dallas, Tex.
W. H. Hodge, Chicago, Ill.
H. M. Lytle, Chicago, Ill.
J. C. McQuiston, East Pittsburgh, Pa.
J. P. Pulliam, Milwaukee, Wis.
M. P. Rice, Schenectady, N. Y.
L. S. Storrs, New Haven, Conn.
W. P. Strandborg, Portland, Ore.
F. L. Thompson, New York, N. Y.
Robert G. Tucker, Indianapolis, Ind.
E. F. Wickwire, Mansfield, Ohio.

#### PUBLICATIONS

C. D. Emmons, president the United Railways & Electric Company of Baltimore, Baltimore, Md., chairman.
G. B. Anderson, Los Angeles, Cal.
F. G. Buffe, Kansas City, Mo.
Thomas W. Casey, New York, N. Y.
Harlow C. Clark, Newark, N. J.
B. J. Denman, Davenport, Ia.
Edwin C. Faber, New York, N. Y.
Myles B. Lambert, East Pittsburgh, Pa.
M. McCants, San Francisco, Cal.
C. C. Peirce, Boston, Mass.
E. Stenger, Denver, Col.
Robert I. Todd, Indianapolis, Ind.

#### ADVISORY COMMITTEE ON ELECTRIC RAILWAY FINANCING

Alfred L. Loomis, vice-president Bonbright & Company, New York, N. Y., chairman.
R. P. Stevens, New York, N. Y.
A. G. Hoyt, New York, N. Y.
H. L. Stuart, Chicago, Ill.
M. W. Gaines, New York, N. Y.

#### CHARLES A. COFFIN PRIZE

J. N. Shannahan, president Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va., chairman.
F. R. Coates, Toledo, Ohio.
J. H. McGraw, New York, N. Y.
Committee to co-operate with the above, J. G. Barry and A. H. Jackson, Schenectady, N. Y.

#### COMPANY AND ASSOCIATE MEMBERSHIP

L. H. Palmer, vice-president and general manager United Railways & Electric Company of Baltimore, Baltimore, Md., chairman.
W. K. Archbold, Syracuse, N. Y.
J. D. Augustus, Louisville, Ky.
H. L. Brown, New York, N. Y.
W. M. Brown, Seattle, Wash.
F. D. Burpee, Ottawa, Ontario, Canada.
T. W. Casey, New York, N. Y.
C. D. Cass, Waterloo, Ia.
B. J. Denman, Davenport, Ia.
J. A. Dewhurst, Philadelphia, Pa.
J. H. Drew, Mansfield, Ohio.
C. D. Flanigen, Athens, Ga.
H. L. Geisse, Wausau, Wis.
F. O. Grayson, St. Louis, Mo.
C. A. Greenidge, New York, N. Y.
J. W. Hancock, Roanoke, Va.
C. F. Handshy, Springfield, Ill.
C. H. Harvey, Knoxville, Tenn.
W. J. Harvie, Auburn, N. Y.
H. B. Hearn, Shreveport, La.
C. W. Kellogg, Boston, Mass.
H. J. Kenfield, Chicago, Ill.
George R. Lyman, New York, N. Y.
J. H. McClure, Aurora, Ill.
E. H. Maggard, Petaluma, Cal.
W. G. Meloon, Portsmouth, N. H.
C. E. Morgan, Brooklyn, N. Y.
W. G. Murren, Vancouver, B. C., Canada.
F. B. Musser, Harrisburg, Pa.
A. J. Purinton, Atlantic City, N. J.
A. E. Reynolds, Springfield, Mo.
K. A. Simmon, East Pittsburgh, Pa.
Claus Spreckels, San Diego, Cal.
W. P. Strandborg, Portland, Ore.
D. P. Strickler, Colorado Springs, Col.
E. J. Thompson, Pittsburgh, Pa.
W. B. Tuttle, San Antonio, Tex.
W. M. Wampler, New York, N. Y.
Herbert Warren, Duluth, Minn.
H. E. Weyman, Levis, Quebec, Canada.
E. S. Wilde, New Bedford, Mass.
F. H. Wilson, Cleveland, Ohio.

#### COMMITTEE ON CO-OPERATION WITH MANUFACTURERS

E. F. Wickwire, vice-president Ohio Brass Company, Mansfield, Ohio, chairman.
G. A. Barnes, New York, N. Y.
William C. Bell, Richmond, Va.
W. D. Blatz, Bridgeport, Conn.
W. H. Boyce, Pittsburgh, Pa.
E. C. Faber, New York, N. Y.
W. H. Gibson, Brooklyn, N. Y.
E. E. Kretschmer, Chicago, Ill.
H. H. Lloyd, Indianapolis, Ind.
E. B. Meissner, St. Louis, Mo.

David Cameron, New York, N. Y.
J. R. MacFarland, Philadelphia, Pa.
J. C. McQuiston, East Pittsburgh, Pa.
G. R. Rowland, New York, N. Y.
J. F. Sloan, New York, N. Y.
C. N. Uhl, Akron, Ohio.
C. L. Van Auken, Chicago, Ill.
P. L. Thomson, New York, N. Y.

### Co-operation with State and Sectional Associations

P. H. Gadsden, vice-president the United Gas Improvement Company, Philadelphia, Pa., chairman.
P. A. Bertrand, Aberdeen, Wash.
John S. Bleecker, Philadelphia, Pa.
F. G. Buffe, Kansas City, Mo.
F. D. Burpee, Ottawa, Canada.
F. C. Chambers, Des Moines, Ia.
G. H. Clifford, Fort Worth, Tex.
J. F. Collins, Jackson, Mich.
F. B. Culley, Augusta, Ga.
E. W. Fowler, Chicago, Ill.
J. W. Hancock, Roanoke, Va.
A. M. Patten, Topeka, Kan.
J. S. Pevear, Birmingham, Ala.
William Phipps, Meridian, Miss.
J. P. Pulliam, Milwaukee, Wis.
J. C. Schade, Green Bay, Wis.
O. J. Shaw, Lincoln, Neb.
T. H. Tutwiler, Memphis, Tenn.
E. A. West, Denver, Col.
C. V. Wood, Springfield, Mass.

### Community Section, Company Section and Individual Membership

C. E. Morgan, vice-president and general manager Brooklyn City Railroad, Brooklyn, N. Y., chairman.
G. B. Anderson, Los Angeles, Cal.
C. H. Beck, New York, N. Y.
C. P. Billings, Pittsburgh, Pa.
F. G. Buffe, Kansas City, Mo.
H. O. Butler, St. Louis, Mo.
T. C. Cherry, Syracuse, N. Y.
C. H. Clark, Cleveland, Ohio.
W. H. Heulings, Jr., Philadelphia, Pa.
S. B. Irelan, St. Joseph, Mo.
A. E. Potter, Providence, R. I.
Martin Schreiber, Camden, N. J.
S. B. Way, Milwaukee, Wis.

### Education

Edward Dana, general manager Boston Elevated Railway, Boston, Mass., chairman.
H. O. Allison, New Brighton, Pa.
George B. Anderson, Los Angeles, Cal.
George A. Barnes, New York, N. Y.
V. W. Berry, Fort Worth, Tex.
Horatio Bigelow, Charleston, S. C.
G. B. Cade, Asbury Park, N. J.
W. J. Edmunds, Pittsburgh, Pa.
J. A. Greenland, Fort Wayne, Ind.
C. J. Griffith, Little Rock, Ark.
W. W. Holden, San Antonio, Tex.
J. S. Hyatt, Highwood, Ill.
M. B. Lambert, East Pittsburgh, Pa.
Richard J. Lockwood, St. Louis, Mo.
M. McCants, San Francisco, Cal.
H. H. Norris, New York, N. Y.
A. B. Paterson, New Orleans, La.
Samuel Riddle, Louisville, Ky.
A. J. Rowland, Milwaukee, Wis.
R. Schaddelee, Grand Rapids, Mich.
J. V. Sullivan, Chicago, Ill.
E. M. Walker, Schenectady, N. Y.

### Insurance

P. E. Wilson, secretary Cleveland Railway, Cleveland, Ohio, chairman.
W. R. Alberger, Oakland, Cal.
O. H. Bernd, Des Moines, Ia.
Granville H. Bourne, New York, N. Y.
C. E. Brown, Napa, Cal.
E. J. Burdick, Detroit, Mich.
Norman McD. Crawford, Columbus, Ohio.
N. H. Daniels, Boston, Mass.
F. M. Hamilton, Chicago, Ill.
A. D. Knox, New Haven, Conn.
John H. Moran, Boston, Mass.
C. E. Morgan, Brooklyn, N. Y.
L. D. Pellissier, Holyoke, Mass.
F. J. Petura, New York, N. Y.

### Location of Midyear Meeting and Convention

W. H. Sawyer, president East St. Louis & Suburban Railway, East St. Louis, Ill., chairman.
M. R. Boylan, Newark, N. J.
H. L. Brown, New York, N. Y.
C. C. Castle, New York, N. Y.
S. J. Cotsworth, Philadelphia, Pa.
E. C. Faber, New York, N. Y.
Thomas Finigan, Chicago, Ill.
Thomas Fitzgerald, Pittsburgh, Pa.
H. B. Flowers, New Orleans, La.
Edward M. Graham, Bangor, Me.
A. A. Hale, New York, N. Y.
J. C. McQuiston, East Pittsburgh, Pa.
C. E. Morgan, Brooklyn, N. Y.
Paul Shoup, San Francisco, Cal.
Claus Spreckels, San Diego, Cal.
E. P. Waller, Schenectady, N. Y.
T. W. Wilson, Wilmington, Del.

### Revision of Constitution and By-Laws

L. S. Storrs, president The Connecticut Company, New Haven, Conn., chairman.
H. C. Clark, Newark, N. J.
C. R. Ellicott, New York, N. Y.
C. D. Emmons, Baltimore, Md.
J. G. Barry, Schenectady, N. Y.

### Special Taxes

W. H. Maltbie, special counsel United Railways & Electric Company of Baltimore, Baltimore, Md., chairman.
F. C. Chambers, Des Moines, Iowa.
F. W. Coen, Sandusky, Ohio.
A. T. Davison, New York, N. Y.
Thomas Fitzgerald, Pittsburgh, Pa.
R. M. Feustel, Fort Wayne, Ind.
A. Flor, New York, N. Y.
Edwin Gruhl, New York, N. Y.
Harry H. Hanson, Newtonville, Mass.
Raymond Hunt, Wilmington, N. C.
A. G. Neal, Washington, D. C.
A. M. Robertson, Duluth, Minn.
H. B. Sawyer, Boston, Mass.
A. C. Watt, New York, N. Y.
T. W. Wilson, Wilmington, Del.

### Valuation

F. W. Doolittle, vice-president North American Company, New York, N. Y., chairman.
E. J. Bechtel, New York, N. Y.
Francis Blossom, New York, N. Y.
H. M. Brinckeroff, New York, N. Y.
H. A. Clarke, New York, N. Y.
Thomas Conway, Jr., Philadelphia, Pa.
J. A. Emery, New York, N. Y.
W. Findlay Downs, Philadelphia, Pa.
T. E. Francis, St. Louis, Mo.
C. W. Gillespie, Staten Island, New York, N. Y.
F. C. Hamilton, New York, N. Y.
W. H. Maltbie, Baltimore, Md.
L. R. Nash, Boston, Mass.
A. S. Richey, Worcester, Mass.
Frank Silliman, New York, N. Y.
Ernest Stenger, Denver, Col.
W. B. Tuttle, San Antonio, Tex.
E. D. Uhlendorf, Chicago, Ill.
James Walker, Chicago, Ill.

### United States Chamber of Commerce Representatives

J. H. Hanna, vice-president Capital Traction Company, Washington, D. C., national councillor.
C. E. Morgan, vice-president and general manager Brooklyn City Railroad, Brooklyn, N. Y., substitute national councillor.

### Joint Committee of the National Utility Associations

Randal Morgan, chairman of the executive and finance committee United Gas Improvement Company, Philadelphia, Pa., chairman.
F. R. Coates, Toledo, Ohio.
C. D. Emmons, Baltimore, Md.
P. H. Gadsden, Philadelphia, Pa.
J. H. Pardee, New York, N. Y.
J. N. Shannahan, Hampton, Va.
R. P. Stevens, New York, N. Y.
L. S. Storrs, New Haven, Conn.
James W. Welsh, New York, N. Y.

### Co-operation with the National Safety Council

J. P. Barnes, president Louisville Railway, Louisville, Ky., chairman.
The following American committees and representatives on national organization's committees were continued from last year without change in personnel:
American Committee on Electrolysis.
American Committee on Inductive Co-ordination.
Conference on Street and Highway Safety.
Mail Pay Committee.
National Defense.
National Industrial Conference Board.
Sub-Committee of the Committee on National Relation on Depreciation.

## Engineering Association

### Automatic Substations

Adrian Hughes, Jr., superintendent of power United Railways & Electric Company of Baltimore, Baltimore, Md., chairman.
L. D. Bale, Cleveland, Ohio.
W. E. Bryan, St. Louis, Mo.
C. A. Butcher, East Pittsburgh, Pa.
C. H. Jones, Chicago, Ill.
F. W. Peters, Schenectady, N. Y.
Ralph H. Rice, Chicago, Ill.
L. R. Wagner, Detroit, Mich.
E. H. Scofield, Minneapolis, Minn., sponsor.

### Buildings and Structures

W. F. Graves, chief engineer Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., chairman.
E. D. Eckroad, Akron, Ohio.
George H. Hodges, New York, N. Y.
J. D. Kent, New York, N. Y.
J. R. McKay, Fort Wayne, Ind.
F. H. Miller, Louisville, Ky., sponsor.
E. S. Myers, New Orleans, La.

H. R. Stamm, New Haven, Conn.
S. J. Steiner, Aurora, Ill.
Judson Zimmer, Gloversville, N. Y.

### Car and Carhouse Wiring

H. H. Adams, superintendent shops and equipment Chicago Surface Lines, Chicago, Ill., chairman.
R. S. Beers, Schenectady, N. Y.
A. T. Clark, Baltimore, Md.
H. C. Eddy, Newark, N. J.
C. G. Keen, Philadelphia, Pa.
John Lindall, Boston, Mass., vice-chairman.
J. D. McKee, Champaign, Ill.
G. H. McKelway, Brooklyn, N. Y.
G. M. Woods, East Pittsburgh, Pa.

### Engineering Accounting

(Joint Committee)

R. B. Rifenberick, valuation engineer United Railways & Electric Company of Baltimore, Baltimore, Md., chairman.
E. J. Dickson, Providence, R. I.
N. E. Drexler, Hampton, Va.
E. D. Dreyfus, Pittsburgh, Pa.
C. R. Harte, New Haven, Conn., sponsor.
F. R. Phillips, Pittsburgh, Pa.
A. S. Richey, Worcester, Mass.
H. E. Riggs, Ann Arbor, Mich.

### Engineering Manual

R. C. Cram, engineer surface roadway Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y., chairman.
Daniel Durie, Connellsville, Pa.
C. R. Harte, New Haven, Conn.

### Equipment

P. V. C. See, superintendent car equipment Northern Ohio Traction & Light Company, Akron, Ohio, chairman.
W. S. Adams, Philadelphia, Pa.
W. W. Brown, Brooklyn, N. Y.
R. S. Bull, Pittsburgh, Pa.
A. T. Clark, Baltimore, Md., vice-chairman.
Daniel Durie, Connellsville, Pa., sponsor.
Lawford H. Fry, Burnham, Pa.
J. L. Gould, New York, N. Y.
J. M. Hipple, East Pittsburgh, Pa.
A. C. Jordan, Elmira, N. Y.
J. H. Lucas, Milwaukee, Wis.
W. H. McAloney, Atlanta, Ga.
J. C. McCune, New York, N. Y.
A. D. McWhorter, Memphis, Tenn.
J. F. Miller, Pittsburgh, Pa.
M. O'Brien, St. Louis, Mo.
E. D. Priest, Schenectady, N. Y.
E. S. Sawtelle, Cincinnati, Ohio.
R. B. Smyth, Boston, Mass.
C. W. Squier, New York, N. Y., secretary.
W. G. Stuck, Lexington, Ky.
H. S. Sweet, Utica, N. Y.
H. S. Williams, Detroit, Mich.
J. M. Yount, San Francisco, Cal.

### Heavy Electric Traction

John C. Davidson, engineer electric traction Norfolk & Western Railway, Bluefield, W. Va., chairman.
A. H. Armstrong, Schenectady, N. Y.
J. M. Bosenbury, Springfield, Ill.
C. E. Brown, Napa, Cal.
H. F. Brown, New Haven, Conn., secretary.
Morris Buck, New York, N. Y.
H. W. Cope, East Pittsburgh, Pa.
A. B. Daus, Chicago, Ill.
J. H. Davis, Baltimore, Md.
J. V. B. Duer, Altoona, Pa.
J. T. Hamilton, New York, N. Y.
Charles R. Harte, New Haven, Conn., sponsor.
E. C. Johnson, Los Angeles, Cal.
Norman Litchfield, New York, N. Y.
J. O. Madison, New York, N. Y.
L. S. Wells, New York, N. Y.
R. B. White, New York, N. Y.

### Power Generation and Conversion

L. D. Bale, superintendent of substations Cleveland Railway, Cleveland, Ohio, chairman.
C. E. Bennett, Atlanta, Ga.
W. E. Bryan, St. Louis, Mo., vice-chairman.
C. A. Butcher, East Pittsburgh, Pa.
H. W. Codding, Newark, N. J.
H. T. Connolly, Annapolis, Md.
H. E. Davis, Utica, N. Y.
H. A. Kidder, New York, N. Y.
E. D. G. Kline, Allentown, Pa.
N. R. Love, Denver, Col.
F. W. Peters, Schenectady, N. Y.
G. G. Post, Milwaukee, Wis.
G. W. Saathoff, New York, N. Y.
E. H. Scofield, Minneapolis, Minn., sponsor.
L. G. Tighe, Akron, Ohio.
L. J. Turley, Los Angeles, Cal.
R. L. Weber, Boston, Mass.
G. I. Wright, Chicago, Ill.

### Power Transmission and Distribution

Charles H. Jones, electrical engineer Chicago Rapid Transit Company, Chicago, Ill., chairman.
J. Walter Allen, Boston, Mass.
R. L. Allen, Syracuse, N. Y.
S. H. Anderson, Los Angeles, Cal.
W. H. Bassett, Waterbury, Conn.
M. W. Cooke, Pittsburgh, Pa.
S. M. Day, Rochester, N. Y.
J. H. Drew, Mansfield, Ohio.
Ralph W. Eaton, Providence, R. I.
D. D. Ewing, Lafayette, Ind.
Charles Gilman, New York, N. Y.
H. W. Griffin, New York, N. Y.
C. L. Hancock, Bridgeport, Conn.
C. J. Hixson, Schenectady, N. Y.
W. E. Huber, Cleveland, Ohio.
Adrian Hughes, Jr., Baltimore, Md.
John Leisenring, Springfield, Ill.
F. McVittie, Rochester, N. Y.
H. S. Murphy, Philadelphia, Pa.
C. P. Nachod, Louisville, Ky.
J. F. Neild, Toronto, Ontario, Canada.
W. J. Quinn, New York, N. Y.
M. B. Rosevear, Newark, N. J., sponsor.
W. Schnake, East Pittsburgh, Pa.
A. Schlesinger, Indianapolis, Ind.
J. M. Waldron, New York, N. Y.
F. J. White, New York, N. Y.

### Purchases and Stores

H. H. Lloyd, purchasing agent Indianapolis Street Railway, Indianapolis, Ind., chairman.
J. Y. Bayliss, Richmond, Va.
R. H. Dalgleish, Washington, D. C., sponsor.
M. L. Evans, Columbus, Ohio.
J. Fleming, Washington, D. C.
W. N. Ford, Memphis, Tenn.
C. A. Harris, Pittsburgh, Pa.
A. E. Hatton, Pittsburgh, Pa.
F. A. Jordon, Atlanta, Ga.
A. C. Kennedy, Cleveland, Ohio.
P. F. McCall, Highwood, Ill.
A. A. Ordway, Boston, Mass.
C. Thorburn, Los Angeles, Cal.
F. L. Wheaton, Detroit, Mich.

### Standards

Charles Rufus Harte, construction engineer The Connecticut Company New Haven, Conn., chairman.
H. L. Andrews, Schenectady, N. Y.
C. C. Beck, Mansfield, Ohio.
J. A. Brooks, Philadelphia, Pa.
L. C. Datz, Memphis, Tenn.
W. G. Gove, Brooklyn, N. Y.
H. A. Johnson, Chicago, Ill.
C. G. Keen, Philadelphia, Pa.
John Lindall, Boston, Mass.
G. A. Peabody, Cleveland, Ohio.
F. R. Phillips, Pittsburgh, Pa.
M. B. Rosevear, Newark, N. J.
H. M. Steward, Boston, Mass.
N. W. Storer, East Pittsburgh, Pa.
N. B. Trist, Pittsburgh, Pa.

### Subjects

Charles Rufus Harte, construction engineer The Connecticut Company, New Haven, Conn., chairman.
Morris Buck, New York, N. Y.
R. C. Cram, Brooklyn, N. Y.
R. H. Dalgleish, Washington, D. C.
Daniel Durie, Connellsville, Pa.

### Unification of Car Design

H. H. Adams, superintendent shops and equipment, Chicago Surface Lines, Chicago, Ill., chairman.
J. A. Brooks, Philadelphia, Pa.
R. H. Dalgleish, Washington, D. C., sponsor.
L. J. Davis, Brooklyn, N. Y.
Charles Gordon, Chicago, Ill.
W. F. Graves, Indianapolis, Ind.
J. W. Hulme, New York, N. Y.
G. L. Kippenberger, St. Louis, Mo.
John Lindall, Boston, Mass.
Victor Willoughby, New York, N. Y.

### Way Matters

H. H. George, engineer maintenance of way Public Service Railway, Newark, N. J., chairman.
V. Angerer, Easton, Pa.
C. A. Alden, Steelton, Pa.
S. C. Baker, East St. Louis, Ill.
E. E. Barnard, Lynchburg, Va.
H. E. Bean, Syracuse, N. Y.
R. H. Dalgleish, Washington, D. C., sponsor.
H. H. Dartt, Williamsport, Pa.
T. H. David, Indianapolis, Ind.
W. R. Dunham, Jr., Detroit, Mich.
E. B. Entwisle, Johnstown, Pa.
T. A. Ferneding, Dayton, Ohio.
R. B. Fisher, Harvey, Ill.
C. F. Gailor, New York, N. Y.
Fred Glenton, Jr., Toronto, Canada.
D. J. Graham, Youngstown, Ohio.
C. L. Hawkins, St. Louis, Mo.
J. H. Haylow, Memphis, Tenn.
H. C. Heaton, Philadelphia, Pa.
N. M. Hench, Pittsburgh, Pa.
M. M. Johnston, New Haven, Conn.
T. J. Lavan, Cleveland, Ohio.
B. P. Legare, San Francisco, Cal.
E. L. Lockman, Boston, Mass.
H. F. Merker, Brooklyn, N. Y.
L. A. Mitchell, Anderson, Ind.
R. H. Pinkley, Milwaukee, Wis.
E. M. T. Ryder, New York, N. Y.
A. T. Spencer, Toronto, Ontario, Canada.

J. B. Tinnon, New York, N. Y.
W. W. Wysor, Baltimore, Md.

U. S. DEPARTMENT OF COMMERCE COMMITTEE TO CO-OPERATE ON SUBJECT OF STANDARDIZATION

R. H. Dalgleish, chief engineer Capital Traction Company, Washington, D. C., chairman.
C. S. Kimball, Washington, D. C.
W. W. Wysor, Baltimore, Md.

SPECIAL COMMITTEE ON AIR RESERVOIR SPECIFICATIONS TO CO-OPERATE WITH THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

R. H. Dalgleish, chief engineer Capital Traction Company, Washington, D. C., chairman.
L. J. Davis, Brooklyn, N. Y.
C. A. Ives, Erie, Pa.
J. A. Leeper, Wilmerding, Pa.
J. S. McWhirter, New York, N. Y.

WOOD PRESERVATION

A. P. Way, electrical engineer American Electric Power Company, Philadelphia, Pa., chairman.
R. C. Cram, Brooklyn, N. Y., sponsor.
M. J. Curtin, Boston, Mass.
J. L. Fritsch, Pittsburgh, Pa.
W. H. Fulweiler, Philadelphia, Pa.
E. F. Hartman, New York, N. Y.
W. L. Harwood, Springfield, Mass.
E. L. Morier, New York, N. Y.
L. P. Scanlan, Newark, N. J.
C. A. Smith, Atlanta, Ga.
R. P. Woods, Kansas City, Mo.

## Subjects and Meetings

A MEETING of the subjects and meetings committee was held in New York on Nov. 20, with the following members present: Chairman W. H. Sawyer, President Shannahan, T. C. Cherry, C. R. Ellicott, J. H. Hanna, Harry L. Brown, J. W. Colton, H. C. Clark, and Secretary J. W. Welsh.

The nature of the morning, afternoon and evening sessions for the Midyear Meeting at Washington were outlined and speakers considered. It was the general consensus that a forum discussion would be highly desirable and a portion of both morning and afternoon sessions will be set aside for this purpose. Certain subjects will be suggested for these discussions—subjects on which it is likely that a difference of opinion will exist—so that the delegates will be inspired to express their views and thus tend to bring out some worth-while points of view for the benefit of the members.

The next meeting will be on Dec. 19 in New York.

## Special Trackwork Committee

THE A.E.S.C. sectional committee on specifications for special trackwork met at New York on Nov. 24. Those present were V. Angerer, chairman; R. C. Cram, H. H. George, C. A. Alden, E. B. Entwisle, G. L. Fowler, C. L. Hawkins, R. E. Hess, E. P. Rounder, E. M. T. Ryder, J. B. Strong, and G. C. Hecker.

Specifications for special track were discussed and the form of report to be made was considered.

# News of Other Associations

## Public Relations Discussed at West Virginia Convention

### Water Power and Regulation Were Other Topics at a Two-Day Meeting of the West Virginia Public Utilities Association, Held in Charleston on Nov. 14-15.

WATER-POWER problems and the difficulties of the street railway and telephone companies were discussed at the seventh annual convention of the West Virginia Public Utilities Association, which was held at Charleston Nov. 14 and 15. It was attended by 120 utility executives. The convention lasted two days, the first day's session ending with a banquet, while on the afternoon of the second day the delegates attended the annual football clash between West Virginia and Washington and Lee.

Officers elected were: President, Mentor Hetzer, vice-president and general manager Moundsville Water Company; first vice-president, W. R. Power, manager Consolidated Heat, Light & Power Company, Huntington; second vice-president, J. E. Harsh, vice-president Virginia Power Company, Charleston; third vice-president, J. D. Whittemore, general manager Monongahela-West Penn Public Service Corporation, Fairmont; secretary, A. Bliss McCrum, Charleston; treasurer, A. M. Hill, Charleston.

D. I. McCahill, general counsel West Penn System, said it was an accepted fact that public service could best be rendered by a company, and that the investments of public service companies should be protected against wasteful competition. No monopoly was necessary, but "fly-by-night" opposition was taboo. He said that it was also recognized that unfair regulation of these companies would be more unfair to the public, which would suffer because of the lack of investment in the company and hence the curtailment of the service.

"Unless companies are allowed to prosper sufficiently to attract capital the public will suffer," he said. "That is why a liberal policy has always been the desire of public service corporations and reasonable rates have been assured the public. This policy stabilizes business and enables the utilities to give the utmost service.

"But every utility must have a publicity bureau to let its works be known. The troubles of utilities are nearly always because of misunderstandings with the public, because they do not know how to express themselves. The legislatures are made up of patrons of the public utilities. If the public utilities have not taken their patrons into their confidence or won their good will, they can never expect legislatures that will understand their works. The public utilities must tell the whole truth to the public and the newspapers are the only mediums."

In extending cordial welcome to the delegates Mayor Wertz said, among other things: "When I was a lawyer I was nothing loath to begin suits against the cold-blooded corporations. In those years you couldn't reason with public utility officials. It was simply a case of smacking down the papers in court. Today when such a suit threatens it is only necessary to call up the utility company at fault and every effort is made to redress the misfortune. It is because you have human officials and the human idea in business, and let me assure you that the public appreciates that spirit."

John B. Garden of Wheeling, manager Wheeling Electric Company, said Wheeling was the fourth city in the United States to have electric cars in operation. He traced the early advent of power into Wheeling, which was the first stand of the electric utilities, and said that it was by no means a rosy road to success.

A talk on "Electric Railways of Today" was delivered by R. P. Stevens, president Republic Railway & Light Company of New York, who said that the street railways of America have an investment in this country of $5,000,000,000 and carry 15,000,000,000 passengers annually. He said that such an investment and service would never be surpassed and that any talk of bus service superseding the railways was already known to be of the idle myth variety.

"Our problems are of today and not of yesterday," he said. He explained the "come-back" of the railways following the World War. Prior to that time too many companies were ready to sit silent and let the demagog threaten. The public got thinking that where there was so much smoke there must be fire and judged the amount of fire by the uncontradicted accusations. It became difficult for the companies to do business, and in their frantic zeal to stay in the game they cut fares to secure new extensions and leases, and then the government's statisticians found that the companies were really trying to operate while losing money. Then came the reaction.

For a time while this reaction to a sane level was in progress, there developed a second cloud in the form of bus transportation, he said. But every city in the United States of more than 50,000 population that had tried bus service exclusively has asked the street railways to come back. However, the companies are finding more and more success by using buses as auxiliaries.

Mr. Stevens said the municipal own-

ership failures that could be cited were legion. The people knew of all these and the one-time clamor had subsided. Independent control of the railways or supervision by a public utility commission safeguarded the public, and where roads were under such supervision they usually were popular, he said. He advocated a step further, pointing out that if government control wasn't desired, neither was ownership of utilities by a few men. He advocated customer ownership and pointed out that the public wants to buy such stock. He said that 25 offerings of 21 companies, aggregating $75,000,000, had been gobbled up by investors who knew that their money was safe.

A. Bliss McCrum, executive secretary of the association, briefly reviewed the work of the body since its formation on Sept. 16, 1915. He explained that the association was a clearing house for ideas of the same business of the whole world. New ideas, from whatever source, were passed on to the members, and in turn any suggestions from the members would be appreciated.

James Weir, field secretary of the West Virginia Publishers and Employing Printers' Association, said that the public utilities must advertise to tell of their service. He told about some companies whose excellent service is absolutely unappreciated, because the public has not been kept informed. This is because the companies are short-sighted enough to think that advertising is an expense instead of an investment. However, if companies advertise and then do not follow up with good service, that advertising is futile. But, the speaker said, the growth of service among public utilities has been such that the public has ceased criticising, even though the reason might not always be understood.

# Efficient Bus Lighting*

BY L. C. PORTER AND A. C. ROY
Commercial Engineering Department, General Electric Company, Harrison, N. J.

A GENERAL survey of bus lighting conditions as they existed in 1923 indicated that the average bus contained: (1) Six inefficient inclosed dome fixtures, generally badly in need of cleaning and usually with one inoperative, due to a burnt-out or missing lamp; (2) 2 or 4-cp. lamps of inferior quality in the dome fixtures; (3) medium color finish on walls and ceiling; (4) wire of sizes too small to carry the lighting load without excessive drop in voltage, and (5) battery of inadequate capacity.

After analyzing the data that had been collected, tests were made in a motor bus body and results showed that sufficient light must be provided to insure the safety of the passengers upon entering or leaving the bus. Elderly people, ladies and those carrying babies require much more light than the younger or more active persons. To prevent eyestrain in case the passengers chose to read, more illumination must be provided in buses than is found in trolley cars because of the more intense vibration and subjection to jolts with the subsequent shifting of print. To secure the maximum value from the ad cards plenty of light is required. As an aid in creating the "riding habit" the interior should present a cheerful and inviting atmosphere. In order to care for all of these points an intensity of about 7 foot-candles upon the reading plane is necessary. Under ideal conditions 1 watt per square foot of floor space will give approximately 4.7 foot-candles of illumination. To secure 7 foot-candles of illumination in a 21-ft. body it is necessary to provide 1.5 watts per square foot or a total of 178.5 watts.

Of the lamps available the 21-cp. gas-filled Mazda lamp is to be preferred. The 6-8-volt 21-cp. lamp consumes 17.84 watts, while the 12-16-volt lamp consumes 16.82 watts. The number of lamps required is 10.

*Abstract of paper presented before the New York section of the Illuminating Engineering Society, Nov. 13, 1924.

As the incandescent filaments of lamps have a high brilliancy, it is necessary, in producing comfortable illumination, that the eye be shielded from this source. Reflectors serve to obscure the filament or diffuse the light, so that it is not directly visible from usual visual angles. As a means of protecting the lamp bulb from breakage, a reflector is also of great assistance.

Light-directing fixtures for motor coach lighting may be classed as (1) Reflector units or those made of glass and open at the bottom, and (2) Dome units in which the lamp is totally inclosed.

Since the question of proper maintenance is a vital factor in good lighting practice, it is desirable to consider these questions: Is it of a shape that will tend to collect dirt? Does it have a metal reflector that will tarnish with age? Are there deep crevices which will be difficult to clean? Are the surfaces roughened and hence dust catchers requiring scrubbing to be made clean? Are there many parts to remove in order to clean the glassware properly and replace the lamps? Do these parts fit easily or are they held in place by small screws, clips, or other devices requiring considerable "juggling"? Are the fixtures constructed so as to withstand the severe vibration to which they will be subjected?

*Number and Arrangement of Ceiling Outlets.* The number and arrangement of ceiling outlets is governed primarily by the hanging height, i.e., the distance from the floor to the ceiling. The headroom in the average bus is seldom over 6 ft. 3 in. If reflector fixtures are installed the distance from the floor to the lower edge of the fixture will be less than 6 ft. Tall passengers will undoubtedly strike their heads on them. With fixtures that are placed up in the roof and flush with the ceiling there is still a very undesirable condition that cannot be overcome with fixtures in the central position. Standing passengers cut off the light that normally should reach the seats and the entire lighting plan is defeated. If, however, there were a headroom of 7 ft. as is found in trolley cars the central fixture would be more suitable. Lamps placed in two rows with each row from 12 to 15 in. from the side of the bus is by far the most desirable arrangement. Here, the reflectors will be out of the way of the standing passengers or those entering or leaving the bus, and the light will not be hindered from reaching the reading plane about the seats.

To insure an even distribution of light the fixtures should be placed from 3 to 3½ ft. apart. The last fixture should be placed about 1½ ft. from the rear wall and the others spaced accordingly. In general, the following number of ceiling outlets should be provided in the bodies listed:

| Length of Body | Number Ceiling Outlets | Minimum Candle-power of Lamps |
|---|---|---|
| 16 ft. to 18 ft. | 6 | 21 |
| 18 ft. to 20 ft. | 8 | 21 |
| 20 ft. to 22 ft. | 10 | 21 |

No matter how carefully designed a lighting system may be as to type and size of lamps, type and make of reflector, spacing, height, etc., if the surroundings are not adapted to reflecting such light as strikes them, an inefficient system may result. The question of proper painting of walls and ceilings is therefore of great importance.

The results of tests of the effect of color of walls and ceilings made in a motor bus are listed in the following table:

INCREASE IN FOOT-CANDLE INTENSITIES PER CENT

| | Dark Ceiling Dark Walls | White Ceiling Dark Walls | White Ceiling Light Walls |
|---|---|---|---|
| Eight bare lamps ... | Std 0 0 | 71 0 | |
| Eight dome units ... | 58 0 | 61 0 | 71 0 |
| Eight reflector units | 84 0 | 110 0 | 132 0 |

Lamps of 21-cp. were employed in each of these tests. For the same expenditure of energy the per cent increase in foot-candle intensities is clearly shown. Assuming eight bare lamps as a basis of comparison in a bus having dark oak walls and ceiling an increase of 84 per cent in intensity may be obtained simply by placing reflectors over the lamps. By painting the ceiling glossy white and the walls light oak and using reflectors over the same eight lamps the intensity may be increased 132 per cent.

*Step Lighting* — Step lighting on motor buses has never been really adequate but the need for such lighting is clearly evident from the safety aspect. Passengers frequently get off a bus facing the rear. It is hard enough to regain one's balance in broad daylight if the bus should give a start, but at night with no light to see by it is still more difficult. As a consequence passengers hang onto the grip or hand rail longer when getting off. This is particularly noticeable in inclement weather. When getting on a dark step of a bus there is a natural pause.

These things were observed and studied in detail, and actual stop-watch checks were made of the time required

to take on and discharge passengers on various runs in the city of Newark. These tests showed that the time taken to get on a bus which had no step light was 11.4 per cent greater than where a good step light was used. Also it was found that 14.8 per cent longer time was required to get off from an unlighted step. With respect to poorly lighted buses, it would appear that in the course of an evening's run, considerable time could be saved by the bus operator if he had his bus equipped with a good step light. Certainly for the sake of safety and convenience to his passengers he should provide this.

While much has been said regarding the standardization of higher voltages it would appear, after considerable study of the matter, that the 12-volt system embodies most of the points necessary for successful operation as far as the lighting is concerned. It is doubted if buses will ever be constructed to seat more than 70 or 75 people. A double-deck bus of this capacity would require the following number and sizes of lamps:

| | Candle-power | Amperes |
|---|---|---|
| **LOWER DECK** | | |
| Nine ceiling | 21 | 10.44 |
| Two headlights | 21 | 2.32 |
| Two platform | 21 | 2.32 |
| One dash | 2 | 0.19 |
| One rear | 2 | 0.19 |
| Three destination | 2 | 0.57 |
| **UPPER DECK** | | |
| Ten ceiling | 21 | 11.60 |
| One platform | 21 | 1.16 |
| Two danger signals | 21 | 2.32 |
| One periscope | 21 | 1.16 |
| Total lighting load | | 32.27 |
| Buzzers, stop light, etc., intermittent load | | 1.00 |
| | | 33.27 |

Reduced to watts this is 33.27 × 14.5 = 482.4 watts. The 600-watt generator, which is in standard production at the present time, would amply take care of 483 watts, lighting and buzzer load and have 117 watts excess power. This amount of power will light seven additional 21-cp. lamps. Starting loads have been neglected, for the total number of ampere-hours required is very small.

The subject of voltage drop is very serious. On a 110-volt circuit 1 or 2 volts drop means only 1 or 2 per cent drop, but where only 6 volts are used, as in buses, 1 volt amounts to 16⅔ per cent. The effect of decreased voltages upon the candle-power output of both the 6 and 12-volt, 21-cp. Mazda lamps is as follows:

| Voltage at Lamp Socket | Candle-Power Output of Lamp |
|---|---|
| 6-8 Volt Lamps | |
| 7.00 | 23.0 |
| 6.50 | 21.0 |
| 6.25 | 19.3 |
| 6.00 | 15.5 |
| 5.75 | 13.8 |
| 5.50 | 11.5 |
| 5.25 | 9.2 |
| 5.00 | 7.8 |
| 12-16 Volt Lamps | |
| 15.0 | 23.0 |
| 14.5 | 21.0 |
| 14.0 | 19.3 |
| 13.5 | 16.8 |
| 13.0 | 14.7 |
| 12.5 | 12.6 |
| 12.0 | 10.5 |

The average jitney was wired with No. 16 stranded wire. A recommended list of wire sizes follows:

| Size American Wire Gage | Aera Circular-Mils | Current* Capacity in Amperes Rubber Insulation |
|---|---|---|
| 14 | 4.110 | 0–5 |
| 12 | 6.530 | 6–8 |
| 10 | 10.400 | 9–15 |
| 8 | 16.500 | 16–24 |
| 6 | 26.300 | 25–30 |

*The ampere-capacity range given in the table above is suggested in order to reduce the voltage drop throughout the lighting circuit to a minimum.

WIRING FOR 21-FT. BUS BODY HAVING 8 to 10 21-C.P. CEILING LAMPS

| Points of Connection | Size of Stranded Wire 6 Volts | 12 Volts |
|---|---|---|
| Battery to ground | 6 | 8 |
| Battery to ammeter | 6 | 8 |
| Ammeter to switch busbar | 6 | 8 |
| Switch throughout circuit | 10 | 12 |
| Connections to lamp sockets | 14 | 14 |
| Common return to ground | 6 | 8 |

*Lamp Sockets*—With the application of miniature lamps to automobile service, it was found that the screw bases originally in use worked loose in the sockets due to vibration. The bayonet base was introduced to overcome this objection and provide the positive positioning of the light source required in headlights and spotlights. The lamps are based with the pins at right angles to the plane of the filament. The single-contact bayonet socket has now been standardized by practically all manufacturers because of economy in wiring, lower voltage drop, simplified socket construction; and other mechanical and electrical advantages.

The total ampere drain on the storage battery exclusive of starting is shown in the following table.

| Continuous Lighting Load | Candle-power | Total Amperes 6 Volts | 12 Volts |
|---|---|---|---|
| Two headlight lamps | 21 | 5.62 | 2.32 |
| One rear lamp | 2 | 0.47 | 0.19 |
| One dash lamp | 2 | 0.47 | 0.19 |
| One gen. indicating lamp | 2 | 0.47 | 0.19 |
| One fare box lamp | 2 | 0.47 | 0.19 |
| One step light lamp | 21 | 2.81 | 1.16 |
| Ten ceiling lamps | 21 | 28.10 | 11.60 |
| Total continuous lighting load | | 38.41 | 15.84 |

| Other Intermittent Operating Devices | Candle-power | Total Amperes 6 Volts | 12 Volt |
|---|---|---|---|
| One stop light telltale | 2 | 0.47 | 0.19 |
| One stop light | 21 | 2.81 | 1.16 |
| Buzzers | .. | .... | .... |
| Total intermittent load in amperes | | 3.28 | 1.35 |

Assuming that on continuous discharge the intermittent load as given would amount to 2 amp. at 6 volts or 1 amp. at 12 volts the total load on the generator would be 40.41 amp. for the 6-volt system or 16.84 amp. for the 12-volt system. The starting load would amount to considerably less than 1 amp.-hr. and so it has been neglected in these computations.

It is recommended that a battery of such size as will carry the entire lighting load for from 6 to 8 hours with the generator idle be selected. This is particularly desirable where the bus is operating on short runs with long layovers. Choosing the mean of 7 hours and multiplying this by the number of amperes required the ampere-hour capacity of the required battery is 280 amp.-hr. and 119 amp.-hr. respectively for the 6 and 12-volt systems.

In summarizing, the following is recommended as the best practice in motor bus lighting.

1. That 21-cp. Mazda C lamps be used in the ceiling fixtures.
2. That 21-cp. Mazda C lamps be used in the step light.
3. The single contact bayonet base case of the type recommended be accepted as standard.
4. Two types of lamps be standardized, viz.: 2 and 21-cp.
5. Reflector fixtures be employed for the ceiling lights.
6. The ceiling be painted gloss white.
7. Six ceiling lamps of 21 cp. be used in bodies 16 to 18 ft. long; eight ceiling lamps of 21 cp. be used in bodies 18 to 20 ft. long; 10 ceiling lamps of 21 cp. be used in bodies 20 to 22 ft. long.
8. Ceiling outlets be arranged on two circuits and be placed on the ceiling 12 to 15 in. from the side walls.
9. Wire of the recommended sizes be employed throughout.
10. All wire joints to be soldered.
11. Battery and ground connections be made as outlined.
12. Switches of ample size be installed.
13. All lighting circuits fused.
14. A suitable switch and fuse panel be adopted.
15. A battery of sufficient capacity to carry the lamp load for from 6 to 8 hours exclusive of generator be provided.
16. The generator be of ample capacity to keep battery charged.
17. Voltage regulation be provided.
18. The 12-volt system be standardized.

## New England Club Meeting

THE December meeting of the New England Street Railway Club will be held at the Copley Plaza Hotel, Boston, Mass., on Dec. 4. The afternoon meeting, which will be called to order at 4 o'clock, will be devoted to a paper on "Maintenance Costs of Car Equipment," by Henry S. Day of the Westinghouse Electric & Manufacturing Company.

Two papers will be read at the evening meeting: "Maintenance of Street Railway Personnel," by S. F. Fannon, director division of public service, Sherman Service, Inc., Boston; and "Street Railway Economics," by T. N. Carver, professor of economics Harvard University.

## Motor Freight Tariffs in C. E. R. A. Territory

AT THE last meeting of the Central Electric Traffic Association the committee on freight tariffs and rates agreed to secure information from the various states with regard to I. C. C. Cause No. 14,828. The committee reports:

In Indiana the Public Service Commission has no jurisdiction over trucks and for that reason no tariffs can be filed in connection with trucking companies where they are made participating carriers. The only way this can be handled is to consider any points reached by them as a station on the line of the railroad which issues the tariff and operates in connection with the truck line.

In Michigan it is entirely legal for any line to start this service provided a permit is first obtained from the Michigan Public Utilities Commission, and there is nothing in the law tending to restrict joint service between electric lines and truck lines.

In Ohio the truck companies are under the jurisdiction of the Public Utilities Commission and joint tariffs may be filed covering service in both directions in connection with them.

# City Fares in Northern and Central Europe*

## The Use of Flat and Zone Fares Is Fairly Equal—In Addition There Is General Use of Special Rates for Workmen and Wholesale Riders, Either with Individual Ride or Season Tickets

By August Winter
Vienna Municipal Railway

OWING to the catastrophic fall in German exchange during the year 1923, this paper can present only a fraction of the conclusions which would otherwise have been possible with regard to the influence of different fare systems. Furthermore, the results which are presented require subdivision because of the unequal influence of the World War on the economic status of members in Germany, the neutral states (viz., Norway, Sweden, Denmark, Holland and Switzerland) and in the Austro-Hungarian succession states. The subdivision as to population follows:

CLASSIFICATION OF STREET RAILWAYS REPLYING TO FARE QUESTIONS

| Number of Cities of: Population | Germany | Neutral States | Succession States | Total |
|---|---|---|---|---|
| Over 1,000,000 | 2 | | 1 | 3 |
| 700,000-800,000 | 1 | 1 | | 2 |
| 600,000-700,000 | 2 | 1 | | 3 |
| 500,000-600,000 | 2 | | | 2 |
| 400,000-500,000 | 3 | | | 3 |
| 300,000-400,000 | 3 | 1 | .. | 4 |
| 200,000-300,000 | 2 | 2 | | 4 |
| 100,000-200,000 | 6 | 5 | 3 | 14 |
| Under 100,000 | 3 | 5 | 4 | 12 |
| Total..... | 24 | 15 | 8 | 47 |

Of the reporting properties 30, or 64 per cent, are municipally owned; 11 properties, or 23 per cent, are owned entirely by private capital; and in the case of the remaining six properties, or 13 per cent, the city is the controlling shareholder to the extent of at least 50 per cent.

Three-fourths of the reporting street railways handle all the mass transport of their cities except for a little steam traffic. Competition is of account only in 12 cities, and outside of Berlin and Hamburg rarely amounts to more than 25 per cent of the total traffic. In Germany's largest two cities the subdivision of traffic is as follows:

| | Berlin | Hamburg |
|---|---|---|
| Street railways..... | 51.68 | 40.1 |
| Steam railroads (electrified at Hamburg)..... | 32.6 | 43.2 |
| Elevated..... | 12.47 | 15.7 |
| Buses..... | 3.25 | 0.31 |
| Boats... | .. | 0.65 |

Vienna is unique in that its nearly 2,000,000 inhabitants have no rapid transit, so that the street railways carry about 95 per cent of the traffic. While a rapid transit system was laid out just before the war, the nearest approach to rapid transit is the coming electrification of the old steam Stadtbahn, which has been leased by the government to the city of Vienna. This railway is 38.8 km. (24 miles) long. Its layout is unfavorable for rapid transit, but it did carry about 40,000,000 passengers (8 per cent of the total traffic) a year up to the time of its shutdown on Dec. 8, 1918.

### Flat and Zone-Fare Systems

A tabulation of fare systems shows that of the 47 undertakings, 22 had unit fares and 25 some form of distance fare. In Germany the proportion was as 10:14; in the neutral states as 11:4; in the succession states as 1:7.

The totals show that the unit and zone-fare systems are fairly equal in number. The effectiveness of one or the other most depend upon local conditions and on the degree to which the public has become accustomed to either. In general, the unit fare preponderates in northern Europe and the zone fare in central Europe, as in Switzerland and the succession states. Berlin is on a flat-fare basis, while Hamburg favors distance fares. [Editors' Note—The original Berlin franchises called for a 10-pfennig fare in the city proper and 15-pfennig fares on the western suburban routes.]

### Proportion that Fare Bears to Wages

The most desirable measure of the relative highness of fares in different communities appears to be the ratio of the fare to the weekly earnings of an average workman. If $F$ is taken to represent the average fare and $W$ the weekly wage the following table appears for the value $\frac{F}{W}$:

| Cities | $\frac{F}{W}$ in Ten-thousandths |
|---|---|
| Scandinavian | 20 to 25 |
| Dutch | 24 to 29 |
| Swiss | 15 to 23 |
| Succession states | 30 to 38 |

German cities have been omitted from the foregoing table because the economic situation was too unsettled at the time this paper was prepared. In any event, the proportion for them is believed to be greater in most cases than in those included.

Another relation is the annual expenditure for fare compared to the local weekly wage. Let $n$ represent the number of rides per annum. Then the annual expenditure will be "$F \times n$". The relationship to the weekly wage $W$ is given by the equation $x = \frac{Fn}{W}$. As the value of $\frac{F}{W}$ for any given group of cities has already been determined as a constant $K$, we can write our equation as

$$x = Kn$$

We know, of course, that the number of rides ("$n$") per inhabitant per annum tends to increase with increase of population and area. Taking Vienna as an example, we have:

$F = 1370$ Kroner.
$W = 630{,}000$ Kroner.
$n = 285$.

Then

$$x = \frac{Fn}{W} = 0.62$$

Eliminating the German cities, it is found that the value of $x$ in the smaller cities is 0.16 to 0.20; and in the larger cities, 0.5 to 0.6. In certain German cities, $x$ attains as high a value as 0.8. This value brings the annual expenditure per inhabitant in comparison to the weekly wage up to the limits usually found only in world cities such as London. For example Lord Ashfield in the June, 1921, *Nineteenth Century and After*, figured that a typical London family of five persons spend £16 a year, or four weekly wage payments, for transport. This amount corresponds to the value $x = 0.8$, since 0.8 multiplied by 5 (persons) = 4 (weekly wages). In Vienna, the value of 0.62 multiplied by 5 (persons) = 3.1 (weekly wages); but in some months of 1922 and 1923 the limit of 4 was attained.

Most of the undertakings reported that different rates of fare were charged according to time of day. About one-fifth of the properties (chiefly in the neutral states) sell individual reduced-rate rides for workmen; but all of the others except five cities have a substitute for this in the form of weekly cards or similar wholesale purchase concessions. The workmen's rates are usually valid up to times varying between 7:30 a.m. and 8:45 a.m. The reduction ranges from 30 to 50 per cent.

Limited-ride weekly cards are most common in German cities but season tickets, punch cards, tear-off coupons or ticket books are used in individual cases. One undertaking sells a workman's card which is valid during the morning hours to 8 o'clock; between 1 noon and 2 p.m.; and between 5 and 7 p.m. Another railway runs special workmen's cars from 3 a.m. onward at a reduction of 25 per cent. Only one property has departed from the peak hour, reduced-rate custom by granting a lower rate between 9 and 12 a.m. when traffic needs most encouragement.

Higher fares for night hours begin in some cases, as early is 7 p.m., but the usual hours are 9 to 10 p.m. with a few choosing an hour or two later. The night fare is generally one and one-half to two times the ordinary fares. In the case of after-midnight or owl service, there are seven properties which charge double to triple the ordinary rates. A detail tabulation follows:

PER CENT FARE DIFFERENTIALS ACCORDING TO HOURS AND HOLIDAYS

| | Number of Railways | Reduction or Increase |
|---|---|---|
| Early morning | 10 | 30 to 50 |
| Late forenoon | 1 | 17 |
| Late evening | 19 | 14 to 100 |
| Owl | 7 | 20 to 230 |
| Round trip | 3 | 25 to 50 |
| Sundays and holidays | 2 | 21 to 25 |
| | 5 | 46 to 100 |

*Abstract of a paper before the Internationaler Strassenbahn und Kleinbahn Verein, Homburg von der Höhe, September, 1924.

Individual round-trip tickets (sold at 28 per cent reduction) are used in but one city. On two other properties, the holder of a transfer costing nothing to 50 per cent more is at liberty to return or to take a second ride at any time during the day.

It will be noted that seven systems have a different fare on Sundays and holidays, two making a reduction and five an increase in the rates. In some cases, the rate on holiday afternoons is double that of the morning, but not higher than the standard weekday fares.

On 31 properties transfers are free; on eight they cost 20 to 50 per cent more and on five they are not granted at all. The rules vary greatly as to the permissible number of car changes. A check at Vienna of season ticket or pass users revealed a transfer ratio of 80 per cent as follows:

20 per cent used no transfers.
46.7 per cent transferred once.
24.5 per cent transferred twice.
7.3 per cent transferred thrice.
1.5 per cent transferred four times.

In other cities, the transfer ratio is generally 25 to 30 per cent, with some cities below this range and others as high as 50 per cent. [EDITORS' NOTE —The transfer indentifications as described in the paper are similiar to those of American practice.] In a few cases the time limits are good for two hours or even for the entire day.

Children are carried free up to ages varying from two to six years or, in some instances, if they are not more than 1 m. (39.4 in.) tall. Most railways grant a concession to children up to twelve or fourteen years of age or, in some cases, if they are not more than 1.3 m. (51.2 in.) tall. The average reduction is 50 per cent, with some as low as 25 per cent and one as high as 88 per cent.

Three cities charge foreigners double to triple the standard rates.

A standard fare is the customary extra charge for parcels, only four undertakings charging by dimensions and three by weight. Twenty-three out of 33 which answered this question made no charge for small parcels. Twenty-five charged for large parcels and one carried them free with the understanding that the motorman would receive a tip. Large parcels are carried on the front platform.

Lap dogs are generally carried free, but sometimes a children's or a standard fare is exacted. Large dogs must ride on the front platform.

### PREPAY TICKETS BECAUSE OF PAPER MONEY

Following the eliminatioon of metal money up to 80 per cent of the properties came to sell prepayment tickets to avoid the bother of paper money. The reduction for these prepaid fares averages 25 per cent; and the proportion of prepaid riders from 30 to 40 per cent. Swiss properties make use of both ticket books and punch cards. The books contain 18 to 33 (occasionally 50) individual tickets sold at reductions of 16 to 30 per cent. All but 10 of the German roads sell books of 10 tickets ordinarily and in other cases of five, six, 12 or 25 tickets. In but one case are these books non-transferable and usable only with the purchaser's photograph. These German books are sold at cuts of 7 to 20 per cent and they bring 15 to 25 per cent of the rides.

Of cities with more than 1,000,000 inhabitants, Vienna offers the only example of an important ratio of prepaid tickets. It has 21 varieties to account for 25 per cent of the traffic. The reduction ranges from 6 to 10 per cent for adults; and to 50 per cent for children.

Nine properties use punch cards and a still smaller number use tear-off coupons. Five properties issue paper tickets, but these are sold without any reduction in rate.

Four of the northern properties are using fare boxes and two of these also have automatic change-makers. Fare receipts are issued in many varieties with or without commercial advertising. On 15 properties in Germany, the fare receipts bear a simplified routing plan which is helpful to both passenger and conductor.

Almost all properties provide their conductors with punches and money satchels; with blue pencils for cancellation of receipts, transfers and tickets and with boxes for carrying the latter, etc. Practices concerning use of cancellation punch, tear-off and blue pencil vary greatly. Conductors are charged out daily with the value of tickets taken and they must make daily reports; but final settlement in most cases is made monthly, except on the smallest properties where daily settlements are the rule.

### WEEKLY CARDS AND SEASON TICKETS SHOW WIDE DIVERSITY

Weekly cards and season tickets for periods ranging from half a month to a year are sold on all but nine properties. The weekly cards are for either 12 or 24 trips, such numbers as 13 and 14 being exceptional. Only 13 properties impose a non-transferability rule and of these but three require photographs of the original buyer. These weekly cards are usually limited to given routes and times of day. Exceptions include a weekly card which permits one ride on six successive Sundays. Weekly cards for students are sold at reductions up to 50 per cent.

As regards season tickets or passes there is a wide diversity in the extent to which they are used by the owners. It is assumed that a system-pass buyer will ride 100 to 200 times a month, and in some cases, 250 to 300 times. A traffic check made in Vienna during 1923 showed that the monthly cards were used about 200 times a month. [This includes the 80 per cent transfer ratio previously mentioned by the author.—EDS.] Individual route cards varied in use from 100 to 150 rides a month to a maximum of 210. The same habits are predicated of semi-annual and annual cards, but few are sold for such long periods. As transferable passes are assumed to have more use than personal passes, they cost 50 to 100 per cent more. Swiss properties sell passes on the basis of a decreasing charge for successive months within the same year.

To avoid the uncertainty of unlimited-ride transportation, some railways sell season tickets limited to two or four rides a day, which makes them similar to punch cards.

The popularity of the weekly cards and season tickets is shown by the fact that they account for 18 to 27 per cent of the rides in the large cities and 44 per cent of the rides in the other cities. The weekly cards secure about two-thirds of this wholesale traffic, attaining in some cases to 30 per cent of all traffic in a given community. In the metropolitan cities, the weekly cards account for only 3.5 to 8.5 per cent of the traffic. The proportion of system to individual route cards is as 2: 3.

A comparison of the year 1923 with 1913 shows that most railways are doing a bigger share of their business with these wholesaling plans than in the past. In Vienna the increase has been fourfold, due chiefly to the inauguration of such cards for shorthaul riding. The latter type of cards in themselves account for 11 per cent of the traffic. Many cities have doubled their use of these cards and a few have trebled.

Season tickets are almost always non-transferable, and of the non-transferable type, 49 per cent must bear the buyer's photograph. The cards are renewed from month to month by means of stamps or, where no photographs are used, by purchase of entirely new cards. Season tickets are generally good on all days of the week; otherwise some increment is charged for Sunday all day or afternoon riding. They are sold at special reductions to employees of the public services, students, war cripples, blind, feeble-minded, etc.

### NUMBER OF PASSENGERS PER CONDUCTOR

From the author's researches, the number of passengers per conductor employed seems to average one per 105,000 passengers per annum. Only eight of the reporting properties used secret service in addition to the uniformed inspectors. On 15 properties, the ride-stealing passenger may be fined twice to ten times the standard fare.

The economic disturbances caused by the World War are shown at their worst in Germany where there were some 64 changes in rates, 30 to 40 of which occurred during the year 1923. During 1924, the gold standard mark (Rentenmark) was restored, and to date two to three reductions, amounting to 20 to 25 per cent, have usually been made in fares—sometimes three to five reductions. The succession states have had fewer variations in fares from pre-war days, viz., seven to 28. Vienna has had 22 changes in fares since 1913 of which nine came in 1922, when it was possible to make reductions of 5.9 per cent and 6.3 per cent.

The standard base fare in Germany before the war was 10 pfennigs (2½

cents). The present base fare on the gold standard is usually 15 pfennigs (3⅝ cents). Sometimes, the base fare is now figured on one instead of two initial sections or on a shortened initial section. Some properties charge double the original fare but have lengthened the ride for the base fare. In the neutral countries, present fares are 1.6 to 2 times the pre-war rates, and in one case they are 2.33 times as much.

These increases in fare were necessitated by increases in materials and wages. Befor the war, wages amounted to 40 per cent of total expenses; during the war and after, to 70 per cent and more. In the neutral states, the ratio of wage increase to fare increase was as 1.7-2.3 to 1; and in the succession states as 1.6-2.2 to 1.

The only thing that enabled some undertakings to continue business under these conditions was that the density of traffic was raised in proportions like the following:

| Cities | Passengers per Car—Kilometer 1913 | 1923 |
|---|---|---|
| Scandinavian | 3.4—4.5 | 3.3—7.5 |
| Dutch | 4.0—4.3 | 3.6—5.3* |
| Swiss | 3.9—5.2 | 3.9—6.0 |
| Succession states | 2.1—3.9 | 3.4—4.9 |

* Year 1924

During the worst period of the exchange situation, 47 German street railways ceased operation. Nineteen of these were restored by May, 1924.

### Conclusions

The changes which have occurred since 1913 have not been confined entirely to fares, although the tremendous upheaval caused by the war led to much experimentation back and forth—zone properties trying unit fares and vice versa. It is significant that in most cases the original system was restored, although compared with 1913 there seems to be a small increase in the number of unit fare systems.

# Equipment and Possibilities of One-Man Cars*

## More Than Half the Operators Use One-Man Cars—The Amsterdam Design Has Electro-Mechanical Safety Devices and, Like Malmo, Uses Passenger Stop-Light Instead of Bell or Buzzer Signals

By T. Egbert van Putten and Einar Hultman
Amsterdam, Holland Malmö, Sweden

AFTER reviewing the course of one-man car development in the United States, the authors state that the consequences of the World War did not permit Europeans to follow with the same broad use of automatic equipment. The majority of one-man cars were simply the original vehicles with one man less and with entrance and exit (usually) at the front platform only. The delays so caused were not relished by the public nor did the operators themselves show enthusiasm for a system that increased their labors.

Nevertheless, the economies of one-man operation have been so great, even in the crudest installations, that every effort must be made to overcome these difficulties. This is obvious when one considers that on 55 properties which replied to the questionnaire and which operate very largely with two-man cars, the cost of platform labor averages 36 per cent of the income and 41 per cent of the outgo.

In view of this, it is desirable to introduce one-man operation gradually on many systems and, where possible, increase the service so that the rate of personnel reduction will not exceed the normal proportion of resignations. The authors of the paper, in submitting replies to the questions following, note that as conditions are rapidly changing, the answers received some time ago might be modified now.

Out of 57 replies to the question, "Do you believe that the increasing competition of motor buses will influence one-man car operation, aside from the general financial troubles now prevailing?" 35 were negative, 10 positive and 12 were either in doubt or considered the problem did not touch them. The authors state that owing to the large increase in motor-bus competition during the preceding year, a round robin at this time might prove more instructive. They believe that the motor bus now run in part as one-man vehicles, can become a very serious competitor. The buses are allowed to operate under more favorable conditions, notably in having no responsibility for paving expense; and in not being as yet subject to the stringent regulations concerning labor, upkeep, etc., that have been the lot of street railways for decades. A number of bus installations have shown far less reliability and continuity of service than the older rail lines, but some are operated on almost as high standards as the tramways. While municipal authorities may be persuaded to limit parasitical competition, it is the duty of the existing transport undertaking to operate motor buses where necessary and to take fullest advantage of one-man car opportunities.

Out of 58 undertakings operating or contemplating the use of one-man cars, 25 had complete or partial installation, two gave up such operation, 14 intend it. The remaining 17 are not contemplating such cars. In most cases, the change has been made merely by blocking off the rear platform. In one instance, where operation is two-man in the city and one-man in the suburbs, a detachable door is carried on the car for addition and removal on the rear platform. In another instance, exit but not entrance is permitted on an unguarded rear platform.

Safety appliances are considered necessary on rebuilt cars by 17 out of 41 undertakings, while 21 do not a three favor them to a limited degree.

Out of 41 managements, six belie in the deadman's handle, 29 do not a six think such a controller desirable though not absolutely necessary. O argument is that a safety device practicable on the trackless bus sure cannot be considered essential to vehicle bound to a definite path.

Door and step control by the operator, whether manual, electric pneumatic, is favored by 18 out of properties replying. Another 18 do favor them and two are in doubt as which is most practicable. The which favor door and step control divided as to the merits of manual, electric or air operation.

Out of 38 replies, 15 consider necessary to have distinct entrance a exit aisles. Of these, 14 would even a barrier. Eighteen are against separation and 19 against barriers. Five some usefulness in separation duri rush hours.

As to the feasibility of having trance at the front and exit at the r with possible provision against entra at the rear, of 36 managements, 14 it is and 18 deny this, while four c sider it difficult because of the sm amount of supervision. To avoid l of time from conflicting streams passengers, it is suggested that duri rush hours rebuilt cars might be erated with rear gates and eventua with rear doors under control of the operator.

A mirror is considered practicable case of rear-platform operation by out of 36 replies, while 14 do not c sider it practicable and two are wi out a definite opinion.

Doors opening automatically in em gencies are favored by only one in replies, although all the others s that as a matter of course the doo gates, etc., should be arranged for e opening by the passengers.

Out of 37 undertakings, 11 favor passenger-operated emergency bra with cords or levers, although one serves that an emergency connection this kind is needless with deadma control; 24 do not favor this and t are in doubt. The authors point that unnecessary application of emergency brake may cause dama They suggest that a circuit-breaki connection might serve on properties level country, leaving some passeng to manipulate the regular hand bra However, it would be generally desira to have some form of emergency c nection which would both cut off po and operate the brakes.

Vestibuled platforms are felt to b necessity on one-man cars by 30 out 39 replies and unnecessary be nine, though some of the latter admit t vestibuling might prove advantageo The authors favor vestibuling becau this permits the removal of body do and bulkheads to facilitate passeng movement and because a man handli paper money and receipts needs prot tion against drafts.

Out of 38 replies, five favor a s for the operator, 27 do not and six in doubt. There is a division of opini as to where the seat should be plac The authors suggest some type t can be moved when it is embarrass to the operator.

*Abstract of a paper before the Internationaler Strassenbahn und Kleinbahn Verein, Homburg von der Höhe, September, 1924.

Of 33 replies, 19 favor bulkheads and me even consider them a necessity. even regard bulkheads as superfluous d three merely report that their pres- t cars are so built. Those which con- ler bulkheads a necessity have plat- rms varying from 1 to 2 m. (39 to in.) length. Most replies hold a inimum of 1.3 m. (51 in.) is required. ne authors observe that the removal the bulkhead is of advantage in en- ling the operator to announce the ops more readily and to be more atchful.

Out of 34 replies to the question, f you were buying new cars would ou favor the American idea of full utomatic equipment?" eight favor afety car standards, 17 do not and ne would recommend only a portion the devices. The authors in com- enting on the replies feel that a plan hich brings such great economies but hich demands so much more from the latform man ought to enjoy at least me protection against overcrowding that the time for stops could be kept ithin limits. Furthermore, the greater aintenance expense will absorb but fraction of the savings with improved ne-man cars.

The answers to three questions re- arding type and size of one-man cars avored were very diverse. Some be- eved that one-man operation should e confined to cars up to 30 passengers, ut others held that it was possible ith cars of 50 to 60-passenger capac- y. Separate exit and entrance would e favored even on the small cars, while he larger type might consider entrance t the front and exit at the rear. If ll interchange is at the front, the ividing line might be carried into the arbody for a length of 1.5 m. (59 in.). he authors suggest that one-man cars p to 50 seats are feasible on systems perating with unit fares, while other ystems must be guided by the char- cter of their fare tariffs.

Four out of 36 say "No" to the ques- ion, "Would you continue to give fare eceipts, especially if you added fare oxes?" three are in doubt and the emainder say "Yes." The last con- ider such control absolutely necessary, r at least for transfer passengers. The eplies developed that some undertak- ngs are operating one-man cars pay- eave. Only a few managements had ny experience with fare boxes.

Of 38 replies, 12 have a flat-fare ystem, 23 have not and three say they se flat fares only in part. It is ad- mitted that the flat fare is undoubtedly he most advantageous for one-man peration, but that the difficulties with one fares are not so great as might e supposed because it is just in the ush hours that many passengers ride n passes or season tickets which, of ourse, lightens the operator's work uite materially.

Of 35 managements, 14 consider one an operation practicable with zone ares and transfer privileges, nine do ot, and 12 believe that it is limited to ines with light traffic. The authors omment that the extent to which such peration is possible depends upon local onditions and the co-operation of the latform men and the public. It is uggested that punching or other mark- ng of receipts, transfers, etc., should e avoided in the course of a trip and that every effort should be made to do this at the terminals. It should also be made easier for the operator to issue receipts as passengers board.

Reduced-rate prepaid tokens or tickets are considered desirable by 18 of 35 managements; eight do not and nine are in doubt. It is observed that if no fare box is used, the fare receipts for cut-rate tickets would have to be special.

Retention of the passenger's bell signal was favored by 24 out of 35 replies, partly because it is so widely used now and partly because an acoustic indication is considered better than a light indication. Three favor light with the bell in reserve and three either have no choice or consider a verbal demand good enough.

Trail cars with one-man motor cars was felt to be practicable by 21 out of 33 managements, while 12 are of the contrary opinion. There seems to be no choice between bell and light signals, but the authors believe the latter will probably become more common.

Out of 36 replies, 17 would pay a premium to one-man operators and 17 would not. The increase varies from 1 to 15 per cent, but the majority think 10 per cent right. The authors judge that an increase is justified in those cases where one-man operation has to be introduced gradually with some provision toward giving a share of the benefits to the personnel to secure their interest.

The replies varied greatly as to prohibition of smoking, but some permitted smoking on the rear platform at any rate. The authors state that special roof ventilators are expected to help in the question of better ventilation.

The advantages of one-man cars in the opinions of the operators are summarized as platform saving, better schedules at the same cost and fewer accidents.

The disadvantages are delays in heavy service, slower schedule speeds, more stolen rides and draftier cars. Some replies suggested that delays in standing time could be made up by faster running time.

### ONE-MAN CARS AT AMSTERDAM

Following the questionnaire and replies thereto, the authors presented details of the modernized one-man cars which have been installed under Mr. Van Putten at Amsterdam and Mr. Hultman at Malmö. The latter was fully described in ELECTRIC RAILWAY JOURNAL, for Feb. 9, 1924.

As only a brief description of the Amsterdam car appeared in ELECTRIC RAILWAY JOURNAL for April 12, 1924, it may be well to mention its outstanding features. Mr. Van Putten, after visiting the United States was convinced that anything but real safety car operation was unthinkable for Amsterdam. He was unable, however, to use the then standard Birney type because the cars were too light, there was only one door for entrance and exit and the automatic equipment was air-operated. He therefore prepared specifications for a larger and heavier design with double-door platforms. Five such cars were built by the Linke-Hofmann Works, Breslau, and fitted with the Bergmann Electric Company's one-man devices. These cars operate on a one-fare route with the comparatively high traffic density of 15 passengers per car-kilometer (a kilometer = 0.62 mile).

The special features of these cars include the following:

The "in" and "out" doors are controlled electro-mechanically by the operator, separately or in tandem.

The doors and folding steps work in unison.

The draft rigging with trailer operation has shock absorbers to avoid injury to riders when starting.

The car cannot start before the doors are closed.

The emergency opening of a door opens the power circuit.

Short-circuiting brakes are used, but part of the energy is shunted to two magnetic track brakes which show red signal lights on the bulkhead while in circuit.

Release of the deadman's control handle cuts off the motor circuit but sends current to the track brakes. The deadman's device can be made inoperative by a pedal when the seated operator is using both hands for fare collection and the like.

One ½-hp. 220-volt roof-mounted motor per platform cares for door operation. These motors have functioned successfully for two years in a daily service exceeding 200 opening and closing movements.

Another feature is the use of an illuminated fare box with coin-tilting table.

Because of the success with new cars, 15 old ones have been fitted with some of the same devices. As space limitations did not permit separate entrance and exit via the front platform, these cars are operated front-entrance and rear exit. Unauthorized rear entrance hitherto has been prevented by a three-arm turnstile. The older cars have no deadman's handle or track brakes.

Mirrors give the operator a view of the rear platform.

To reduce car noises, the passengers' push button does not actuate a bell or buzzer but closes a line-voltage circuit which causes a red lamp to light alongside the operator.

In general, these cars eliminate step accidents and do not delay passenger interchange owing to separate aisles for entrance and exit.

The standard 10-cent fare is dropped into a box. No receipts were issued during the turnstile period.

Smoking is permitted on the rear platform.

The reconstruction cost of the cars did not exceed 5,000 guilders ($2,010) per car while the platform labor saving alone is 7,000 guilders ($2,814) a year. The service was increased about one-sixth to permit an equal number of riders to be carried during the rush hours. The net annual saving on twelve cars is 50,000 guilders ($20,100) a year.

Because of an accident in which a two-man car was derailed with its front end hanging over a canal, agitation was begun against one-man cars with rear platform turnstiles. As a result, the City Council ordered the removal of the stiles. This will necessitate a return to fare receipts which are to be issued by machine.

# Maintenance of Equipment

## Spinning Rivets on Controller Fingers

WHEN a rivet is driven by ordinary methods through a number of thin laminated pieces of material, it is difficult to make sure the several pieces are pulled down tightly against each other when the rivet head is formed. This condition



A Rivet Spinning Machine in the Twin City Rapid Transit Company's Shop Has Been Found to Do Very Good Work in Riveting Controller Fingers

is encountered in riveting together the laminations of controller cylinder fingers.

The mechanical department of the Twin City Rapid Transit Company has found a rivet spinning machine to be very useful for doing such work. Not only is the production equal to or greater than can be obtained by driving the rivets, but the spinning method has been found to give a much better job. There is no tendency for the shank of the rivet to swell between the laminations, as is the case with a driven rivet.

The die shown in the head of the machine in the illustration is a common commercial type of rivet spinning die. The various parts of the controller fingers are assembled in the jig shown, which is fastened to the bed of the machine. This jig pivots about a point at the back end. The operator grasps the handle on the jig, holding the parts in place with his finger, as shown. He then swings the jig over so that the rivet comes into position under the spinning head. A pin in the bed of the machine, shown in the illustration, can be depressed so as to allow the jig to swing under the spinning head, and upon being released this pin engages a hole in the bottom of the jig, so as to hold it in exactly the right position. The head of the machine is depressed by means of a foot lever manipulated by the operator. The rivet head is formed very quickly, giving an unusually smooth, well-formed job.

## Car Cleaners Use Self-Propelled Carriage

TO AVOID the necessity of the car cleaner climbing up and down a ladder and moving it from place to place when wiping the outside of a car and washing the windows, an easily movable carriage has been developed by the Boston Elevated Railway. This is a simple framework made of iron piping and placed on four small iron wheels. The car cleaner stands on the platform, which is so arranged as to



Easily Movable Carriage Which Has Doubled the Efficiency of the Exterior Car Cleaners

height that he can wipe the entire side of the car from top to bottom for as wide an area as his arms can reach. After he has done this he grasps the car body firmly and rolls the carriage to a new position. It is thought by the company that this device has more than doubled the efficiency of the men cleaning car exteriors. It is being used in all the shops and carhouses of the company where there is a concrete floor on which to operate the carriage.

## Self-Closing Waste Can

REALIZING that good housekeeping is one of the most important elements of fire prevention, cleanliness has been promoted in the



This Type of Waste Can Has Foot Control of Hinged Cover

Wheaton shops of the Chicago, Aurora & Elgin Railroad by the use of improved waste cans. By the device installed there the problem of keeping the waste in the can and the lid shut was solved successfully. The can, of the usual 30-gal. sheet-iron variety, was provided with legs, and a heavy lid hinged at one point so arranged that it can be opened by means of a foot treadle. The four legs are made up of 1½-in. x ¼-in. steel bars bent to the proper form and riveted to the side and bottom of the can. About 6 in. from the



The Cost of Car Painting Has Been Reduced by the Use of a Simplified Color Scheme Without Striping or Lettering

bottom of the can, two pieces of 1-in. x ¼-in. steel bar, bent to form a right angle, were riveted to the side of the can. These form a support for the fulcrum of the simple lever which extends from the foot treadle in front to the connecting rods located on each side of the can. These rods connect with projections fastened on the lid and serve as a means of transmitting the motion of the lower lever to the can top. With this arrangement it is possible to step on the treadle at the front and cause the lid to rise. The foot lever is made up of ¼-in. x 1-in. material, the connecting rods of ½-in. round steel and the projections on the lid are of ½-in. round iron forged out flat on one end in order that it may be riveted to the lid. The lid is held shut by its own weight. On each side of the can is a handle located in a convenient position for carrying.

The outfit is painted black, and the instruction "Throw Dirty Waste In This Can" is stenciled on it in yellow paint. Several of these cans are located about the shop and have proved a means of keeping the shop clean.

## Simplified Color Scheme Aids Spray Painting

IN ORDER to reduce the expense of car painting, in so far as it is possible to do so without seriously detracting from the appearance of its vehicles, the Eastern Massachusetts Street Railway has reduced the number of exterior colors to two. The entire body is painted yellow, while gray is used for the roof, trucks and the other equipment under the car. No striping or lettering is done except the placing of a number in the center of the side.

Two exterior colors are applied by means of a De Vilbis spray painting machine. The window guards, which are black, are painted by a dipping process. Windows are left in place during the painting process and are protected by a coating of Preservit. After the painting has been completed, this coating is removed and takes with it all paint which may have spattered onto the glass.

Spray painting is used also inside the cars for the floors and sides. The headlining and the ceiling on the platform, which are white, are painted by hand. Such small equipment as may be located inside the car is also hand painted.

In order to encourage riding by keeping the rolling stock clean and fresh looking, each car is painted once every 14 months. It is said that the use of the color scheme here described and the spray painting process has cut in half the cost of car painting.

## Clamp Holds Armatures in Vertical Position

By R. S. Neal
Assistant Superintendent of Equipment, Kansas City Railways

IN THE shops of the Kansas City Railways it has been found advantageous to handle armatures in a vertical position during the operation of dipping and baking. They are dipped with the pinion end down, and are baked in the same position, to avoid excess flow of varnish to one side, as would be the case if they were drained or baked horizontally.

The type of clamp shown in the accompanying illustration, while of simple construction, has proved handy and safe for lifting and moving armatures about by the commutator end of the shaft. This clamp is shown in both the closed and open positions. It consists of two forgings hinged together at one side, while the other side is held together with a bolt which pulls the clamp tight on the shaft and holds it securely. The inside faces of the clamp that come in contact with the shaft are lined with soft copper to prevent any possibility of scoring it.



This Clamp Is Used at Kansas City to Handle Armatures in a Vertical Position for Dipping and Baking

## Sand Storage Simply Arranged at Decatur

SAND for use on the interurban cars of the Illinois Traction System is stored in a simple wooden sand bin in the Decatur shops. The bin is 6 ft. high by 6 ft. long by 5 ft. wide and has a capacity of approximately 6 cu.yd. The sloping top contains a six-mesh, No. 14 wire screen, 5 ft. long by 4 ft. wide. A sliding metal door at the forward end, operated by means of a lever and link, closes a chute opening by means of which sand may be poured into a wheelbarrow. To the rear of the bin is located a No. 2 Viloco sand dryer of 1 cu.yd. capacity, manufactured by the Vissering Company. After the sand has gone through the dryer it is shoveled onto the screen of the bin. The sloping top is thus of great convenience. This removes any foreign matter or large particles of sand which would be undesirable for use in the sand box on the cars. Sand is drawn off into a wheelbarrow as needed. The simplicity in the construction of the bin and the lineup of the various parts of the apparauts are the outstanding features of the arrangement.



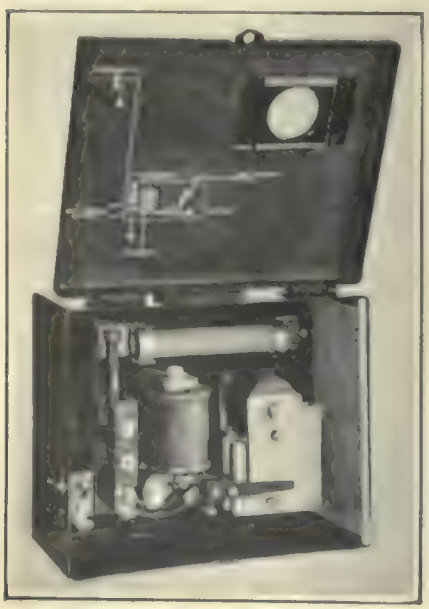
Sand Storage Bin of 6 Cu.Yd. Capacity Has Screen Sloping Top Through Which Sand Is Screened After Removal from Stove Type Sand Dryer

# New Equipment Available

## Developments in Thermostatic Control

BY LEE P. HYNES
Consulting Engineer Consolidated Car Heating Company, Albany, N. Y.

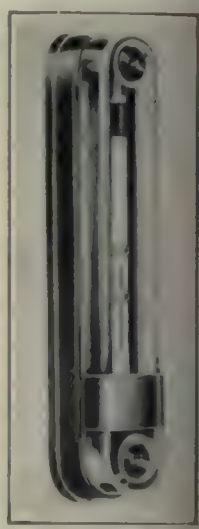
IN THE first thermostatic control equipments much of the sensitiveness of the thermometer was lost through the metal casing and also through the retarding effect of the car walls. Crews found that without fear of detection they could break the thermometer and keep the heat on continuously, by pressing on the metal case sufficiently to crush the glass tube.



Improved Main Switch for Thermostat Control

A molded glass cover instead of a metal cover has provided a satisfactory solution of the trouble and is used in the Consolidated Car Heating Company's thermostat of the latest type as shown in an accompanying illustration. A back plate of molded insulation keeps the car wall from affecting the operation and provides insulation for the electrical connections. The molded glass cover is mounted on this base with a yielding cushion, covering the mercury tube, which is also mounted in yielding supports to take up any shocks or jars. The glass cover has no openings, as temperature changes are more readily carried to the mercury by direct conduction through a thin strip of copper. This is folded around the outside of the glass case, looped under its edges and clamped around the mercury bulb. This strip is insulated from actual contact with the cover. The glass cover must be smashed before anyone can tamper with the thermostat and the mercury tube is clearly visible.

Improvements have also been made in the main magnetic switch controlled by the thermostat. Early mercury thermostats were unable to handle much current. Sparking on the contact points oxidized the mercury and ruined the tube. The new equipment includes simply a main switch having an operating magnet, a blowout coil, a series resistance and a fuse for the thermometer circuit. It has no relays, no auxiliary circuits nor contacts, no shunt resistances such as were used with previous equipments. The mercury simply shunts the magnet coil and by a correct design and balance of current values, there is no overloading of the mercury contacts. Three new convenient features have been added to the equipment: (1) An indicator visible through a glass window in the switch box shows whether the switch is open or closed; (2) A small control switch on the side of the box permits the conductor to throw the heat control off or on at will; (3) An opening in the side of the box allows easy inspection and cleaning of contacts.



Visible Mercury Thermostat With Molded Glass Cover

When the small switch in the "off" position, the main switch opens and keeps the heat off until the switch is reset to "on." When the control switch is thrown to the "on" position, it throws the thermostat into control. If heat is needed, it will be turned on, but the thermostat cannot be prevented from shutting off the heat when the car attains the desired temperature.

In the new design an inspector can see at a glance the position of the mercury column, owing to the glass thermostat cover, and also the position of the main switch through the glass window in the switch box. The switch box cover can be locked if desired and need only be unlocked for replacement of a fuse or inspection of contactor tips. The opening in the side of the box for inspection of the contacts is closed by a transite liner.

When the box cover is open, the transite wall shown at the right in the illustration can be pulled out and the contacts inspected or cleaned through the end opening in the box without removing the arc chute.

# The News of the Industry

## Springfield Franchise Passed

### Voters of Illinois City Pass Ordinance Giving Rights to Railway for Twenty Years

An extension of its street railway franchise was obtained by the Illinois Power Company in Springfield at the election on Nov. 4. The majority in favor of the proposal was 2,500. More than 26,000 votes were cast. The extension is for 20 years, the time limit in Illinois. The existing grant of the company does not expire until 1928, but the approach of the expiration date made it difficult for the company to plan ahead satisfactorily and to arrange the best terms for future financing.

#### Proposal Rejected in the Spring

Early in the spring a franchise proposal was submitted to the City Council and approved by the members of that body, but when the matter went before the voters in April it was defeated by a small majority. At the spring election, just as at the later one, the principal dissenting voice to the company's proposal was raised by Commissioner Willis J. Spaulding. Mr. Spaulding operates a municipal electric light and power plant at Springfield and is president of the Municipal Ownership League of America. If the matter were left to him he would municipalize the entire transportation system of Springfield. He is also a motor bus enthusiast and professes to see the day ahead when street railways in cities of the size of Springfield, some 60,000, will disappear. In order to bolster up this profession he told only parts of the story with respect to the use of the bus in Bay City, Saginaw, Decatur, St. Louis and other cities. He dangled in the faces of the voters of Springfield the prophecy that a complete, new, modern bus system could be installed and operated successfully on a 5-cent fare either by the city or a private concern for $500,000 and provide "much better and cheaper service" than that supplied by the railway.

#### One Dissenting City Commissioner

The Mayor and the three other commissioners answered Mr. Spaulding's strictures effectively. It is impossible here to recite all the points that they made. Their principal reasons for favoring the franchise were summarized by the commissioners and kept constantly before the public. As they saw it the ordinance does these things:

Protects all the rights of the people, including the right of purchase by the city, at fair value when the city is ready to buy.

Compels adequate transportation service to be furnished.

Requires the company to pay approximately a half million dollars into the city treasury for use of streets during the life of the franchise.

Requires the company to pay the expense of paving between its tracks and 1 ft. outside of rails, thereby insuring no interruption of the city's great improvement program.

Does not in any way interfere with the use of streets for buses and other means of public travel. The franchise is confined to street car travel only. The city is free at any time to decide as to future plans relating to other means of transportation.

The Springfield company has not been slow to take up the bus. It is now operating five vehicles in service coordinated with its railway lines. The company also conducts the electric, gas and steam heating services in the city and supplies electric service to DeKalb and Sycamore. The present fare is 7 cents cash with four tickets for 25 cents and 40, 50 and 60-ride monthly tickets to be sold for $2, $2.50 and $3 respectively.

## Extension of Time Likely for Improvement of Yonkers Lines

Admission has been made by Assemblyman Alexander H. Garnjost of Yonkers, representative of the Fourth Assembly District, Westchester County, that the New York Central Railroad Company cannot be expected to fulfill the requirements of his electrification bill. This bill was adopted at the last session of the State Legislature and provided for the electrification of the Getty Square branch and main line of the Putnam Division within the Yonkers city limits by Jan. 1, 1926.

Assemblyman Garnjost says he will offer an amendment to his bill at the next Legislature granting the New York Central Railroad a time extension for the improvement of its Putnam lines in Yonkers.

The railroad has been working out the plans and specifications necessary for the improvement, but there are several reasons why the road could not be electrified by Jan. 1, 1926. Principal among these is the fact that all grade crossings must first be eliminated, in accordance with a recent state law. Another reason is the unavoidable delay which the railroad must face in securing steel for the various bridges which must be reconditioned.

Assemblyman Garnjost, after explaining these reasons, said the railroad must show "good faith" in its plans for the electrification of the Yonkers sections of the Putnam Division, i.e., must either make known its plans or commence the work, before he will offer an amendment to his bill granting the New York Central the necessary time extension.

George W. Kittredge, chief engineer of the New York Central, has estimated the cost of improving the Getty Square branch at $2,000,000 and of the main line at $4,000,000. The plans have not yet been approved by the Public Service Commission.

## Buses for Detroit

### Emergency Bus Lines Being Run There by Department of Street Railways as Municipal Enterprise

The Detroit Department of Street Railways does not own any buses, but one bus line is being operated by the city and another is to be put into operation. As soon as the buses are delivered that the city intends to purchase three lines will be established. The equipment in use on the Belle Isle line is owned by the Department of Parks and Boulevards. Bus service is being started on the Eight Mile Road, west of Woodward Avenue. The buses will run from the Eight Mile Road and Livernois Avenue district to the Highland Park plant of the Ford Motor Company. The route will cover approximately 5 miles in territory not now served by any kind of transportation. The seven buses to be used will be rented from the Detroit Motorbus Company.

As indicated by the desire of the commission to purchase additional bus equipment the new services just mentioned are only a beginning. The Street Railway Department has made extensive plans for bus service, including the conversion of the Kercheval-Concord carhouse into a modern bus terminal. It is proposed to use the terminal to house the buses on the Belle Isle line and the buses for the proposed Mack-Warren bus line. It is planned to care for the street cars now housed in the carhouse at the yards at St. Jean and Kercheval Avenue.

The rate of fare to be charged on the Eight Mile Road bus line has not been announced. The department will guarantee the bus company the cost of operation, but the line will be operated without profit to the department. It has been announced by the D. S. R. management that the fare will not exceed 10 cents, a charge which will be reduced as patronage of the line increases.

Three buses were supplied by the Detroit Motorbus Company when the D. S. R. was constructing the new Mount Elliott line, which has just been put into service. The new railway serves as a feeder to the Gratiot Avenue line and comprises 2 miles of new track beginning at Gratiot and McDougall Avenue. At Mount Elliot Avenue a spur track runs to the rear of the Dodge plant. Cars enter through a subway into a prepayment station similar to the one in use at the Ford plant at River Rouge.

The Street Railway Department recently placed posters in the cars stating that operation of the bus service depended upon the action taken by the Council. The posters show pictures of the double-deck buses which the commission has recommended for use.

## Retail Merchants Want Cars

### Discussion Between Mayor Hylan and President Huff of the Third Avenue Railway, New York, Broadcasted

Retail merchants on Forty-second Street and 125th Street, New York, bitterly oppose any plan to remove the crosstown tracks in those streets, as suggested by Mayor Hylan. They declare that such action would prove a great loss to their business, and they are decidedly against any suggestion for the substitution of buses for cars. The Third Avenue Railway has a pile of letters to this effect. They are the result of a brief canvass made by the company following a letter it received on Nov. 13 from Mayor Hylan. This letter, which was addressed to President S. W. Huff, said, in part:

Why do you send your people about getting petitions signed to continue a public nuisance? You realize that cars running in the middle of the street, as they do on Forty-second Street and 125th Street, as well as other streets in the city, are a menace to the lives of the people in boarding and leaving these cars.

You do not seem to realize that buses will replace these surface lines. At least you should be alive to the situation and make some progressive move yourself.

Some of the people who have signed these petitions and written letters I understand have expressed themselves in favor of buses.

The New York Railways realizes that buses will take the place of their surface lines and has made a request to the Board of Estimate and Apportionment to this end, and no doubt the board will give serious consideration to same.

On the day the letter was received a quick canvass was taken of the opinions of the retail merchants affected, and these testimonials, with a letter from President Huff, were transmitted to the Mayor on Nov. 14. The correspondence, with quotations from some of the letters from the merchants, was then made the subject of a radio talk Nov. 14 from the Third Avenue broadcasting station at Third Avenue and 130th St. A portion of Mr. Huff's letter to the Mayor follows:

Some of the more than 200 people who wrote personal letters opposing the removal of tracks on Forty-second Street and on 125th Street may have expressed themselves in favor of buses at other locations, but their letters undoubtedly expressed their wishes with regard to the street upon which their business is located, and they are emphatic against the removal of track from these streets.

Passengers in boarding cars away from the sidewalk expose themselves to no more risk, if as much, than they do in crossing streets. The records show that there have been comparatively few accidents from this source, and when once on the cars passengers are practically immune from accident by reason of the stability of the car and its freedom from danger to which buses are exposed.

You are correct in your statement that I do not seem to realize that buses will replace these surface lines. It is hard to realize a mere theory when you are confronted with facts that contradict it. The fact is that buses have not supplanted trolley cars to any substantial extent where the travel is sufficient to justify trolley car operation, and that where attempts have been made so to supplant car operation the business interests have suffered to such an extent that street car service had to be resumed. There may be developments in the future which may justify the substitution of buses for trolley cars. If so, it is purely an economic question and will solve itself, but there is nothing at the present time that would indicate such substitution will take place.

With regard to the proposal of the New York Railways to remove its tracks and substitute buses, I think you will be able to judge better just what this means if you were to ascertain which tracks they are proposing to remove. The companies of the Third Avenue Railway System have, by regular proceedings, abandoned and for the most part removed during the last 5 or 6 years in the territory occupied by the New York Railways, approximately 27 miles of trackage for the reason that the operation over this trackage no longer served any large public purpose or was justified financially. During this period the New York Railways, although it had discontinued operation of a substantial amount of trackage, has not legally abandoned this trackage by reason of being in the hands of a receiver. When you have finally ascertained just what trackage that company is proposing to abandon, I doubt very much whether you will find that the New York Railways proposes to abandon any substantial portion of its trackage that is now being operated.

I wonder, Mr. Mayor, whether you couldn't find the time in the near future to talk this thing through with me. We are both trying to serve the same people, to ascertain their wishes and to do that which is best for them. Something might be gained by a free discussion of this matter. Will you see me?

Studies made by the Third Avenue Railway of the passengers and vehicles passing certain points in congested districts indicate the disproportionately large amount of street space per passenger carried taken by motor vehicles as compared with that taken by trolley cars. Below will be found a table of studies in congestion made during the early part of this year. Studies of this kind are being continued by the company.

STUDIES IN CONGESTION

| | Total Passengers | Total Vehicles | Passenger per Vehicle | Square Feet Street Space per Passenger Carried |
|---|---|---|---|---|
| Count 1—Cars | 3,373 | 84 | 40 | 8 |
| Autos | 829 | 437 | 1 9 | 43 |
| Count 2—Cars | 14,031 | 500 | 28 | 13 |
| Autos | 4,948 | 2,546 | 1 9 | 42 |
| Count 3—Cars | 9,875 | 264 | 37 4 | 8 95 |
| Autos | 10,559 | 5,287 | 2 | 40 5 |
| Count 4—Cars | 2,487 | 39 | 64 | 5 6 |
| Autos | 2,438 | 877 | 2 75 | 28 7 |
| Count 5—Cars | 993 | 20 | 50 | 7 1 |
| Autos | 314 | 218 | 1 4 | 55 2 |
| Count 6—Cars | 5,590 | 138 | 41 | 8 7 |
| Autos | 2,598 | 1,779 | 1 5 | 35 4 |
| Count 7—Cars | 1,500 | 77 | 19 5 | 20 |
| Autos | 4,615 | 2,436 | 1 9 | 43 |

Count 1 was made at Forty-second street and Broadway Jan. 17, 1924, 5 to 6 p.m., westbound.

Count 2 was made at Forty-second Street and Broadway, Jan. 17, 1924, 12 to 8 p.m., westbound.

Count 3 was made at Broadway and Fiftieth Street, Jan 23, 1924, 12 to 8 p.m., northbound.

Count 4 was made at Broadway and Fiftieth Street, Jan. 23, 1924, 5 to 6 p.m., northbound.

Count 5 was made at Broadway and Hudson Street, Yonkers, Jan. 7, 1924, 5 to 6 p.m., northbound.

Count 6 was made at Broadway and Hudson Street, Yonkers, Jan. 7, 1924, 12 to 8 p.m., northbound.

Count 7 was made at North Avenue and Burling Lane, New Rochelle, Jan. 19, 1924, 12 to 8 p.m., northbound.

## New York City Must Answer $30,000,000 Charge

Under a decision rendered by the United States Circuit Court of Appeals on Nov. 20 the city of New York must answer a charge made by Lindley M. Garrison, former receiver of the New York Municipal Railroad Corporation and allied companies, now included in the B.-M. T., that the city caused damages approximating $30,000,000 to the railway corporations. The suit begun by Mr. Garrison charged that under an agreement made in 1913 the municipal authorities failed to carry out certain plans for the extension of the transit system to which they were committed.

Judge John C. Knox recently granted an order requiring the city to answer this complaint and corporation Counsel George T. Nicholson took an appeal to the Circuit Court of Appeals.

## Report Delays Settlement

### Citizens' Committee Insists on 7½-Cent Fare in Cincinnati—Directors Call Negotiations Off

Insistence upon an absolute and unconditional guarantee of a 7½-cent rate of fare for the first three years of the traction franchise by the citizens' committee in a report to Mayor Carrel threatens to undo at the eleventh hour the work of the conferees in the electric railway negotiations with the city of Cincinnati, the Cincinnati Street Railway, the Cincinnati Traction Company and the public. The result may be a continuance of a 10-cent rate of fare, if not a further increase, after Jan. 1. The directors of the Cincinnati Street Railway in a formal statement issued on Nov. 22 absolutely decline to accept the recommendations of the citizens' committee and insist that they will go no further with the present negotiations.

In its report to the Mayor, the citizens' committee says in substance that "the ordinance as drafted is much superior to the present ordinance, that there was an agreement as to fundamentals and that the ordinance should be sent to the City Council for passage after it is modified to provide for an absolute guarantee of a 7½-cent rate of fare for the initial three-year period of the grant." It is this provision to which the directors of the Cincinnati Street Railway take exception.

Under the terms of the ordinance as drafted the new operating company, the Cincinnati Street Railway, proposes to rehabilitate the entire system and to improve the service. It will immediately create a fare control fund of $400,000 to insure stabilization of the rate of fare. If the operating expenses of the company exceed the income from fares, the company will be permitted to draw upon the fare control fund until it is down to $200,000 if necessary before any increase of fares will be permitted. There is an additional guarantee for the first three years of a low rate of fare, since the proposed ordinance provides that during that period the company must feed into the fare control fund one-sixth of the return allowed upon capital as soon as the fund goes below $400,000. So that under the terms of the grant, even before the fund is reduced to $200,000 the company is compelled to give up a part of its earnings in the interest of a low rate of fare. After that has been done and the fund is reduced to $200,000 an increase is then permitted. During the negotiations the company sought to modify that clause so that in the event of the granting of a higher wage to the platform men it would not be compelled to devote any of the return on capital to keep down fares. Upon the insistance of City Solicitor Saul Zielonka and Street Railroad Director W. J. Kuertz, however, that modification was not included in the grant.

The company's representatives, however, during all of the negotiations have refused to accept a clause that would guarantee unconditionally a 7½-cent rate of fare for the first three-year period.

## Boston Mayor for Municipal Ownership

Mayor James M. Curley of Boston advocated before the special legislative committee on the finances and control of the Boston Elevated Railway that the Elevated should be taken over by the cities and towns in which it operates and the fares reduced to 5 cents. He would tax the communities for the deficit from operation. The committee heard the Mayor on Nov. 25.

Under the Mayor's plan the communities, constituting essentially the Metropolitan area, would take the Elevated by condemnation, after the property had been valued, and then manage the road by a board of public trustees, as at present. Mr. Curley says two of the trustees should be appointed by the Mayor of Boston and three by the Governor of Massachusetts. The Mayor contended that in regard to its importance to the public the railway should be considered a civic problem on a par with the schools, the water system or the sewerage system. High real estate values and proper conduct of business could be assured only if the railway received proper civic consideration. There are 500,000 private autos in Massachusetts and many bus lines, and it is the Mayor's idea that the car riders should no longer be required to support the electric railways. The Mayor figures that it would increase the taxes about $9,000,000 to make the railway a direct charge on the community, but Representative Henry L. Shattuck of the committee estimated that the tax increase would be nearer $14,000,000.

The committee is charged with the responsibility of recommending a policy with respect to the future operation of the Boston Elevated. It is expected to file its report by Dec. 15.

## Bus Legislation Likely in Indiana

Utilities and bus operators are wondering what will happen at the session of the Indiana Legislature next January. It is significant to note that in the recent political campaign the successful candidate for Governor, while he stated that all unnecessary commissions should be abolished, did not specify just what commission he meant. This is considered by utility operators to mean that the administration will not look with favor on the abolition of the Public Service Commission.

On the other hand, the State Chamber of Commerce has launched a movement for a bus and truck regulatory law. It is planned to make a survey of the traffic needs of the entire state and present reports to the individual chambers of commerce and civic bodies in each city. They will be asked to study the reports and present suggestions to be condensed into a bill which will be introduced in the Legislature.

The question of bus regulation first came up two years ago at a meeting of the Assembly, but a movement to provide regulation was defeated. The development of bus transportation in the state has reached such huge proportions during the last two years that this question is most certain to come up again at the next session. In fact, officials of city and interurban railways are insistent that some sort of regulation be imposed on bus lines. The main contention at the last session on the part of bus men was against the form of the bill rather than on the principle of regulation. It would appear to be natural to seek to put the bus lines under the jurisdiction of the Public Service Commission, but members of the commission say they are overworked now and cannot assume additional responsibilities.

## Objections to Pittsburgh Looping Will Be Heard

The City Council of Pittsburgh, Pa., recently voted to conduct hearings on request of objectors to the plan of the Pittsburgh Railways for rerouting downtown cars. The action was taken after the Council had been advised that a decision on the plan was a matter for the Traction Conference Board, and that the Council was not to be regarded as a factor in a rerouting plan. Much discussion has taken place since the company formulated its plan for short-looping in the business district. The main points in the plan were referred to in the ELECTRIC RAILWAY JOURNAL, issue of Nov. 22. In talking to the Real Estate Board recently about traffic problems, Arthur W. Thompson, president of the Pittsburgh Railways, discussed the proposed changes in routing and the reduction in the size of the loop in the downtown district. He said that at the present time there was a crisis in congestion caused by the increased number of vehicles entering the area during the day—80,000 vehicles at the present time, not including the street cars. Mr. Thompson said that it was because of the lack of transportation facilities that people had been forced to a greater use of automobiles and that this was one of the very things which was bringing about a greater congestion and which the company was trying to remedy or temporarily relieve.

He referred to the routes which would be shortened and the few streets to be converted into one-way thoroughfares. It was proposed, he said, that the loops be extended on Sundays, holidays and in off-peak hours at night.

## Passes Popular the First Week in Oklahoma City

Whether the weekly passes now sold by the Oklahoma Railway, Oklahoma City, Okla., giving unlimited riding on the street cars for $1.25 a week, will prove to be a sufficient booster for traffic to work the company's salvation in the crisis that has been growing more acute for several months, the pass is proving popular with some car riders. About 500 passes were sold during the first week. The records show that the average cost of each ride by holders of the weekly passes was 5.4 cents. The passes are transferable and are good on any street car at any time during the week for which they are sold for as long a ride as the holder cares to take. The company has an application pending with the Corporation Commission for a 10-cent fare, on which a hearing has been set for Dec. 5.

## Fare Increase Imperative, Says Twin Cities Head

An oral hearing has been set for Dec. 1 before the Minnesota Railroad Commission, on the petition of the Twin City Rapid Transit Company for an increase from its 6-cent fare.

Horace Lowry, president of the company, recently stated that the present fare means confiscation of property, and that a 7-cent fare is absolutely necessary. The traffic decline on the line has been steady. In the first 10 calendar months of 1920, the peak year for Minneapolis and St. Paul, car passengers carried numbered 198,500,000, against 172,711,000 in the corresponding period for 1924. Mr. Lowry pointed out that in the summer of 1921 both the Minneapolis Street Railway and the St. Paul City Railway applied to the commission for valuation of property and fixing of a reasonable rate of fare. The commission granted a 7-cent fare, but both cities appealed and the courts reduced the fare to 6 cents on the ground that the state commission, not having yet valued the properties, could not reasonably fix a fare. Mr. Lowry said that expecting a value would soon be arrived at, the company continued to operate at the 6-cent fare for three years. He said the evidence of the company's financial condition has been filed with the commission.

## Rights of Community Bus Line in Court

Although two court injunctions have been granted in Los Angeles, one on the application of the Pacific Electric Railway against the Community Donational Bus Line operating between the city of Los Angeles and the city of Venice, the operators of the free bus system have defied orders and continued operations. It was recently brought out that two days prior to the date of the issuance of the injunction the bus line was leased by the original owners to a Mr. Prole of Oakland, and under the name of the Merchants' Bus Service began operating under the Prole system. Mr. Prole, inventor of the Prole Transfer Coupon System, is running the buses by having the passengers buy coupons which are redeemable at stores in towns through which the buses operate.

After issuance of the first injunction, the Community Donational Bus Line appealed to the California Supreme Court to have the order of the Los Angeles Superior Court set aside, but the Supreme Court denied the defendants a writ of prohibition which would have prohibited the Los Angeles judge from enforcing the injunction, on the ground that the Superior Court had jurisdiction. After the buses were changed to the Merchants' Transfer Bus Line under the Prole system the operators were cited for contempt of court, being charged by the court with having violated the terms of the second injunction.

The bus line has also made application to the Railroad Commission for a permit to operate as a common carrier. The Prole or coupon system of buses is now operating while the matter is still in the higher courts for a decision.

## Forfeiture Clause in Draft for Rockford Company

Mayor Herman Hallstrom of Rockford, Ill., has completed his draft of a franchise ordinance for the Rockford City Traction Company. This is in accordance with instructions in a resolution recently adopted by the City Council. The Mayor has sent copies of the draft to the railway officials and the Aldermen for their consideration. The Mayor said that the ordinance could be introduced as a substitute for the one now before the Aldermen.

It provides for a 20-year grant indorsed by referendum. The ordinance leaves the matter of the operation of motor buses subject to permits from the Council. The draft provides for assessing full cost of track paving against the street railway company, with permission for payments on the installment plan and for practically doubling the street improvement program for thoroughfares containing car tracks. The Mayor would abandon the plan for requiring a $750,000 cash bond to guarantee completion of promised improvements and would substitute a forfeiture clause that the franchise shall end if promised improvements are not made within the time specified in the ordinance. Opinions on the Mayor's draft differed widely.

## Transit Talks Tell Tale of B.-M.T.

With the desire on its part to inform the patrons of its difficulties and problems, and at the same time to express its intention of doing everything it possibly can to help its patrons, the Brooklyn-Manhattan Transit Corporation, through its chairman, G. M. Dahl, has been carrying on a series of advertisements in the daily papers. These advertisements are called "Transit Letters." In the first one Mr. Dahl gives some facts about the Brooklyn-Manhattan Transit Corporation as to its passenger traffic, its wages expenses, its miles of "L" and subway lines, and the number of cars which serve its patrons. In subsequent letters the ownership and directorship of the B.-M. T. are discussed, and in a later letter Mr. Dahl tells what the stockholders and directors have done for the patrons of the company during the past year and a half since they have been responsible for the policies of the B.-M. T. He says that from the very start the public interest has been the chief interest which has controlled the company.

## Fare Request Refused in Malden

The Malden City Council has refused the request of the trustees of the Boston Elevated Railway for the right to raise the fares in that city from 5 to 6 cents without a tranfer and to 10 cents with transfer. These rates were asked in accordance with a new fare schedule established by the elevated on other parts of the system.

The railway has been unable to put the increase in fares into effect in Malden owing to a clause in the franchise granted by the City Council permitting the company to run buses in that city, in which it stipulated that local fares shall not exceed 5 cents. The ruling has caused some confusion. The fare from Malden to Medford, for example, is 5 cents, while from Medford, which is under the new rate schedule, to Malden, the fare is 6 cents on strip tickets.

The Malden City Council has also adopted an order requiring the Boston Elevated in the future to advertise two weeks in advance any proposed substitution of buses for electric cars in Malden.

The City Council has empowered the Mayor to call a meeting of citizens to discuss the traffic system of the city and the petition of the Eastern Massachusetts Street Railway for permission to run buses from Malden Square to the Revere Line, and so complete the system to Revere Beach.

## One-Man Car Operation Planned in Cleveland

The Cleveland Railway has announced its intention of using one-man cars during non-rush hours on a number of lines in Cleveland, Ohio, that have not been meeting operating expenses. The announcement has met with opposition from Councilmen. John J. Stanley, president of the company, insists, however, that only the courts can stop his company from using the one-man cars.

The company plans to start the use of one-man cars on Dec. 1. They will be run on the Clifton Boulevard line, and possibly on the Fairmont Boulevard line, between the hours of 9:20 a.m. and 3:50 p.m. and from 6:20 p.m. to 12:30 a.m.

Paul Wilson, secretary of the railway, says the company's plan to use one-man cars is an economy measure. He points out that the company asked for an increase of 2 cents a car-mile in its operating allowance to bring this allowance up to 28 cents a car-mile, but that so far the City Council has not acted on this request.

Immediately after the announcement by the company of its intention to run one-man cars, the Lakewood City Council, at a special meeting, passed an ordinance making it a misdemeanor to operate a car with a one-man crew. The Cleveland City Council also adopted a resolution instructing the City Street Railway Commissioner to refuse to authorize operation of one-man cars.

It is the general opinion in Cleveland that the right of the company to operate one-man cars will be threshed out in the courts.

The City Council on Nov. 24 also received resolutions authorizing the Cleveland Railway to operate bus lines on four main arteries leading to the westerly limits of the city from the Public Square. The bus fare would be 10 cents, with a 1-cent transfer charge to street cars and a 4-cent transfer charge from cars to buses.

Actual operation of buses by the railway will not be undertaken, however, until the Ohio State Supreme Court has decided whether the City Council or the State Public Utilities Commission has the right to grant bus franchises within the city limits.

## Railway Sustained in Revocation Action

Controversy has developed over the Eastern Massachusetts Street Railway's track location in Mason Street in Salem, Mass. In 1909 the Aldermen there awarded the railway a location in the street so as to supply the power house with coal. The company now purposes to convert the power plant into a carhouse and to have the approach through Mason Street; but the City Council of Salem last July voted to revoke the track rights in Mason Street and ordered that the tracks be torn up. The Council took the position that here was no "public convenience and necessity" for the use which the present Board of Public Trustees intended to make of the location. The Mayor of Salem approved the Aldermen's order. The trustees of the Eastern Massachusetts disagreed with this decision. As a result the Salem city government appealed to the Department of Public Utilities, but the department, on Nov. 24, filed a decision adverse to the city. The commission points out, however, that the Salem city government has the right to appeal to the courts. Two members of the Public Utilities Department dissented from the majority decision, partly on the ground that the decision of he city authorities should be undisturbed unless it was shown to be "unreasonable or ill considered."

## Buffalo Conductors Put on Their Honor

Fare boxes on all cars of the International Railway, Buffalo, were abolished on Sunday, Nov. 16, as a result of the honor system to be put into operation by Mitten Management, Inc. Herbert G. Tulley, president of the International, said to the platform employees:

> Mitten Management, Inc., has never considered the fare box in accord with the co-operative spirit. It has been awaiting an opportunity to make employees responsible for fares collected rather than depend upon a mechanical device to protect the company against employee dishonesty and to reduce the conductor to a mere change-maker, hopelessly trying to watch myriads of coins dropping into a small glass case.
>
> In the old days of low wages it was not considered an injustice to deprive the company of a few fares now and then. Those days are gone and most companies have replaced the old haphazard method with the drop coin fare box.
>
> Where fare boxes are used the conductor is required to ring up on his register for every person passing the box. The conductor ordinarily protects himself from loss by actually keeping his register lower than that of the fare box and tallies the two at the end of the run by ringing up a sufficient number of fares to make the two agree. This procedure, while protecting the conductor against personal loss, provides him with neither the means nor the incentive to see to it that every passenger is obliged to pay a fare.
>
> I. R. C. prefers to trust to the honesty of its men. This it has taken occasion to further encourage in that their higher wage will largely depend upon the collection of a fare from every passenger. I. R. C. trainmen have proved themselves worthy of this trust.
>
> I. R. C. will protect its earnings, first, by making payment of fare a personal transaction between the passenger and the conductor, thus preventing the passing of passengers without payment of fare; second, by giving its men such an interest in its earnings that robbing the company means robbing themselves.

Some time ago the company stopped the registration of transfers and passes.

## High School Points Moral in Atlanta

The opening of the Girls' High School, in Atlanta, Ga., the first of next year may bring to a head the right of the public to demand new accommodations while denying sustenance to its railway. When the school board asked for more trackage and more cars to carry girls to and from the new school building, the Georgia Railway & Power Company responded by stating it had no money to lay new track or to buy and operate any extra cars. Preston S. Arkwright, president of the company, recently reviewed the situation. He said it would be difficult in any event to provide transportation for the students of the high school as the building was located in a most inaccessible place. Further, he said that the company was financially unable to make any extensions. On this point he said:

> You've got a right to depend upon the railway as the agency for reliable service. But that agency must be kept in condition to furnish the service on which you depend. You can't levy taxes, paving burdens and the like and on top of it all turn jitneys loose and expect the railway always to be in the position to meet the demands of the public. I guess it will be either the steel cars or the jitneys.

H. M. Atkinson, chairman of the company's board of directors, corroborated Mr. Arkwright's statements. The chairman said that the railway receipts were decreasing from the corresponding periods of last year at the rate of almost $50,000 a month, and that even last year they were far below normal. He said that under the contract with the city the company was paying in 1924 in bridge rentals, paving service and taxes more than $800,000, which is about one-sixth of the entire railway revenue.

It is expected that the John A. Beeler organization will soon report on the valuation of the Georgia property to the special councilmanic committee conducting an investigation into the petition for relief filed by the company with the City Council in December, 1923. The company sought relief necessary to place the railway on a "living basis." Among other things it asked for elimination of jitney competition on streets where cars operate, 10-cent cash fare, a continuation of the ticket rate for 6⅔ cents and the elimination of all gross profits taxes and street paving assessments.

## New England Motor Transport Conference

A conference to discuss the highway transportation problems of New England will be held at Boston on Dec. 8 and 9, under the guidance of the National Automobile Chamber of Commerce, and with the co-operation of many New England organizations representing motor vehicle users. Electric and steam railroad men will be among the speakers, and special sessions will be devoted entirely to discussion of how electric railways are using the motor bus, and how railroads are solving, with the motor truck, the problem of handling local less-than-carload freight.

Other topics will be intercity motor coach operation, what the commercial use of New England's new highway system means, and how the automobile is helping to reclaim New England's deserted farms, the federal government's research program into the economics of road use and a discussion of safety and highway congestion.

## Home Rule Law Ambiguous

### Representative of Railways Wants the Measure Amended so There Can Be No Doubt About Its Meaning

The Home Rule Commission held a public hearing at Albany on Nov. 20. Since the enactment of the city home rule law, the Home Rule Commission has extended its study of municipal self-government in New York and other states and, as asked by municipal officials, has examined certain questions which have confronted several of the cities of the state in applying the provisions of the home rule law and in operating thereunder. The commission has attempted a solution of some of these difficulties and has endeavored to aid the cities with its advice in all cases in which application has been made therefor. The hearing was regarded as most important because of the possibility that some provision allowing cities further jurisdiction over public utility corporations might be allowed to get into the home rule for cities law.

James L. Quackenbush, on behalf of the Interborough Rapid Transit Company and other street railways, submitted to the commission a memorandum urging an amendment to the law. Very briefly the purpose of Mr. Quackenbush's proposal is to remove the doubt and uncertainty that prevails with respect to the power of the Municipal Assembly of New York City and the legislative bodies of other cities of the state to annul or supersede various provisions of the public service commission law, the railroad law, the transportation law and the rapid transit act.

#### Says Laws Should Lessen Litigation

Mr. Quackenbush said that it could be urged that judicial interpretation of the act would probably exclude the right of local legislative bodies to supersede any provision of the laws mentioned, but that so long as the home rule law remained in its present form and until the courts had construed its provisions in cases arising from time to time the uncertainty would remain and give rise, as it already had done, to many contentions, embarrassments and delays that could be obviated by the amendment proposed.

The attorney said that the limitations that the courts, by judicial construction, will ultimately place upon the right to supersede state statutes by local legislation should so far as possible be explicitly stated in the act itself. Mr. Quackenbush holds that otherwise the Legislature is placing an unnecessary burden upon the courts, and is chargeable with responsibility for the delays and uncertainties incidental to litigation. He says that laws should tend to lessen litigation rather than to encourage it. He then cited as a specific instance the difference of opinion between the Corporation Counsel and the Comptroller of the city of New York with respect to the scope of the city home rule law that largely involves a determination of what are "matters other than the property, affairs or government of cities. This controversy involves in part the right of the municipal Assembly to amend a portion of the transportation corporation law in its application to the city of New York." In this controversy the comptroller clings tenaciously to the opinion that with the sanction of the municipal Assembly the city can proceed with the Mayor's municipal bus plan without the need for further enabling legislation, while the Corporation Counsel holds to a contrary view.

Other subjects discussed at the hearing were:

1. Necessary and desirable amendments to the home rule constitutional amendment.
2. Scope of term, "property, affairs and government." Does it include all matters usually embraced in city charters?
3. Right of the Legislature to enact general laws relating to property, affairs and government of cities.
4. What general laws apply "in terms and effect alike" to all cities?
5. Necessary or desirable amendment to the home rule law.
6. What difficulties or doubts have been experienced by municipal authorities in construing and operating under the home rule law?
7. Is the duty of the Legislature to limit the power of cities to borrow money, etc., under Sec. 1 of Article XII of the Constitution, to be performed by the enactment of general laws or emergency laws, or may the Legislature so act by a special law.
8. What disposition should be made of Article II of the general city law. (General provisions.)
9. What disposition should be made of the optional city law?
10. Should there be a statutory classification of cities for convenience in enacting city laws and relating to their property, affairs and government?

## Advisory Council on Accident Prevention in Chicago

To co-ordinate activities in the important work of preventing accidents on the Chicago Surface Lines, a general advisory council on accident prevention has been established with the following members: V. T. Noonan, chairman; H. H. Adams, C. H. Evenson, H. B. Fleming, F. M. Hamilton, F. L. Kriete and J. Z. Murphy.

The direction of accident prevention work in each department will be delegated to departmental councils which will supervise and direct protective and preventive measures within their respective jurisdictions and carry into effect plans that will insure full co-operation on the part of all employees.

It will be the duty of the general advisory council to investigate reports of unsafe conditions or dangerous practices, to provide appropriate remedies therefor and to formulate policies for the most effective promotion of accident prevention.

## New Cars Allocated in New York

The New York Transit Commission issued an order on Nov. 17 to the Interborough Rapid Transit Company allocating to service on various subway lines, where the commission believes there is the greatest need, the 100 new cars recently delivered of the 350 ordered by the railway under the commission's instructions. Improvement of rush-hour conditions at the Times Square station was an important item in the order.

## Railroad and Ferry Traffic in 1923 —325,920,315 Passengers

The need of future provision for the handling of suburban passengers into New York City was recently made plain by figures made public by the New York Transit Commission giving the steam railroad and local ferry traffic into and out of New York in 1923. The great growth of local commutation traffic within the past few years has been studied by the engineers of the Commission who are preparing to arrive at a definite policy of handling the situation.

The trunk railroads entering New York or approaching from the Jersey side carried in 1923 a both-way passenger traffic of 234,867,481 people. This figure represents an increase of nearly 5 per cent over the traffic in 1922. This traffic includes the following: Baltimore & Ohio 620,000; Central Railroad of New Jersey 15,752,834; Delaware, Lackawanna & Western 22,201,447; Erie 30,889,917; Lehigh Valley 743,502; Long Island 69,766,867; New Haven 17,666,194; New York Central 30,025,529; New York, Ontario & Western 551,753; New York, Westchester & Boston 5,796,093 and the Pennsylvania Railroad 40,853,345.

In addition to the figures of steam railroads there were 42,014,142 local or rapid transit passengers carried in and out of the city by the Hudson & Manhattan Railroad which when added to the steam railroad traffic gives a grand total railroad traffic entering and leaving the city of 276,881,623. Even this total does not include the passengers entering and leaving the city on several ferry lines. Total traffic by ferry in and out of New York amounted to 49,038,692. With the steam railroad traffic there was a grand total of railroad and ferry traffic in and out of New York during 1923 of 325,920,315 passengers.

The number of railroad commuters entering and leaving the city on the various railroad lines was 147,172,484. The grand total of railroad and ferry commuters was 238,225,318.

Eliminating Sundays and holidays, and using a traffic year of 340 days, the basic figure generally employed by the Transit Commission—as a divisor—there are shown to be an average of 700,662 daily commuters in and out of the city. The total daily traffic in and out of New York City is 958,589. These figures represent two-way traffic passengers. The difference between the two, divided by 2, or 129,000 passengers, probably represents an approximate figure of the daily visitors to New York City, the great majority of whom arrive from outside the commuting zone.

## State Control Urged for Missouri Bus Lines

The Missouri Legislature, which will convene next January, will be asked to enact a law placing all bus lines in Missouri under the control of the Missouri Public Service Commission. The measure that will be presented to the state lawmakers will probably require all bus companies and service car organizations to report regularly to the state body concerning their profits, etc., and also to provide indemnity bonds for the protection of their patrons.

In St. Louis the present regulatory body is the Board of Public Service, working under a city ordinance passed several years ago by the Board of Aldermen. Under the city ordinance the bus company pays the city 3 per cent of its gross earnings, but is not required to submit a statement of profits.

Richard W. Meade, president and general manager of the Peoples Motorbus Company, has stated that his company would welcome a law placing it under control of the Missouri Public Service Commission. Mr. Meade is quoted as follows:

> Such control already exists in New York and other States. We would also favor a provision requiring monthly statements of earnings such as are submitted by other public utilities. The Peoples Motorbus Company already carries ample indemnity bonds and sets aside a certain percentage of its earnings for an accident reserve fund in addition.

## Advertising to Help Company and Patrons

In an effort to picture some of the difficulties that are encountered in railway operation to the end that the public will give its co-operation in solving problems the Worcester Consolidated Street Railway, Worcester, Mass., has been using space liberally in the advertising columns of the Worcester newspapers. General Manager Henry C. Page says the results have been satisfactory and that he hopes advertising, never before done in Worcester by his company, will become a permanent policy. "We have a commodity to sell," Mr. Page explains, "which is as important to every householder in Worcester as the merchandise sold by the department stores, and the fact that we have a monopoly is no reason why we should not advertise it." He said he was particularly well pleased with the slogan in the recent advertising, "Help us to help you to better service."

## British Expert Praises Detroit System

The Department of Street Railways, Detroit, Mich., has come in for a lot of praise from Lord Ashfield, one of the foremost authorities on transportation. The chairman and managing director of the railway, tramway and omnibus companies of the "Underground" group of London recently visited Detroit and predicted that the municipally owned lines would be a great success so long as the people continued to keep politics out of the system. He said that he had traveled on the lines and had been impressed with the smoothness of operation and the remarkable ability displayed in handling the crowds of workmen. He says it is an efficient system, splendidly managed. Lord Ashfield, formerly Albert Henry Stanley of Detroit, came with his family to Detroit when he was a small boy. He was general manager of the Detroit United Railway for twelve years.

## Canadian Railway a Public Benefactor

Capilano Canyon, a famous beauty spot near Vancouver, B.C., has been presented outright by the British Columbia Electric Railway to the Vancouver Board of Trade, to be retained by it in trust for the public as a park. Approximately 145 acres is comprised in the gift. "We feel that this property should belong to the public in deed as well as in name," said George Kidd, president of the British Columbia Electric Railway in making the presentation.

The property was acquired by a predecessor company, evidently for a hydro-electric power site. Ever since it has been the Mecca for thousands of tourists. Recently the company was offered a considerable sum for a portion of the canyon by an individual who intended to promote it as a pleasure resort. Turning down this offer, the company decided to present it to the Board of Trade.

The gift has resulted in a great many expressions of appreciation by press and public. The following statement by J. K. Macrae, president of the Board of Trade, was only one of many: "The present offer was entirely unsolicited on our part, and the greatest credit is due to the company and to Mr. Kidd for the splendid public spirit which has prompted them to make this gift."

## Wildcat Buses in New York a Menace

Condemning the "municipal buses" operated under the jurisdiction of the Department of Plant and Structures of the city of New York as "wildcat firetraps," the New York Transit Commission, in a statement issued by Commissioner LeRoy T. Harkness attacked the "emergency bus system" maintained by the present city administration. The attack came after a municipal bus, operated in Queens County, caught fire with serious injury to several passengers. An investigation of the matter by the grand jury is now under way. As no one was killed probably only civil indictments will result.

Commissioner Harkness disclosed the sensational conditions discovered by Transit Commission inspectors on several municipal bus lines in Manhattan, the Bronx and Queens. Not only was overloading revealed, but in many instances, it was charged, the vehicles were either not equipped with "emergency doors" in the rear, or these doors were fastened in such a way as to be useless in emergencies.

"The burning of passengers in these wildcat firetraps," said Mr. Harkness, "is not the only danger to the traveling public. Most of these buses are simply bodies mounted on truck chassis, and were never intended to carry human beings."

"The dangerous and deplorable conditions revealed by the Queens accident," the statement declares, "merely dramatized the menace to passengers through the operation of wildcat buses which do not have the safeguards provided by adequate franchise restrictions and general utility regulation."

## Plea for Restoration of Service on Wisconsin Line Dismissed

The Railroad Commission of Wisconsin has dismissed the petition of residents of Omro who asked it to order the Wisconsin Power & Light Company to re-establish railway service between Oshkosh and Omro despite the fact that it has been operating at a loss due to improved highway conditions and the increased use of the private automobile. Bus service has been established on a schedule comparable with that of the discontinued interurban line, but fear was expressed that during the winter months bus service would not be as reliable as rail service. A statement of earnings and expenses introduced before the commission by the company for the year 1923 showed a deficit of $4,215. The resumption of service would necessitate a complete rehabilitation in all departments of the system. To do this to conform with the present standards of the company would cost $146,716.

## Grand Rapids Company Submits Interesting Data on Car Capacity

A recent survey of daily traffic on Monroe Avenue in Grand Rapids, Mich., over which cars of practically all routes of the Grand Rapids Railway pass showed that from 4 to 6 p.m. on an average day 102 cars passed capable of carrying 4,032 passengers and actually carrying 3,628. In the same period 1,052 automobiles passed with a total capacity of 4,532 passengers and actually carrying 1,918. The street cars carried 98.8 capacity loads, while the autos carried 42.5 per cent.

The railway made a diagram of these figures and submitted it to its patrons. The diagram pictures one street car which would carry 48 passengers and under it and on the same scale were pictured 27 automobiles, the number needed to carry 48 passengers at 1.8 passengers per automobile, as was the case on the test day. The 27 automobiles easily took up six times as much space on the rush hour street as the single street car.

On the particular day in question the street space occupied by the street cars figured 4,692 ft. and that by the autos 14,728 ft. or 75.8 per cent of the street space or more than three times the space occupied by the street cars. These 102 street cars were only 8.83 per cent of the traffic, but they carried 63.8 per cent of the passengers.

## Newly Organized Company Promises Good Service

The newly organized Erie Railways, Erie, Pa., will put into effect any reasonable measures which will improve service in Erie. These promises were made recently by R. A. Meyers, general manager of the property, at a conference held in the office of the city solicitor. Mr. Meyers said that some time ago a campaign was started to have service speeded up for the benefit of patrons, and it was in connection with this plan that the cars were made pay as you leave on outbound trips to facilitate service downtown. At the same time the pay-as-you-enter plan was put into effect on inbound trips to prevent delays in the business district and to aid in discharging passengers. He said that the plan was to increase the capacity in accordance with the demands for service and that every suggestion that had been brought to the company's attention for the betterment of service was receiving serious consideration.

## Interurban Advertises Improvements in Service

Many improvements and innovations in service mark the general change of schedules put into effect by the Illinois Traction System, Peoria, on Sunday, Nov. 9. Without exception on the main divisions the changes include the addition of trains and shortening of schedules.

The principal innovation is the inauguration of three "fliers" each way




Ad Typical of Recent I. T. S. Campaign

daily connecting Peoria, Springfield and St. Louis. These trains make the trip from the heart of Peoria to the heart of St. Louis in less than 5½ hours. They are in addition to a de luxe parlor car train each way daily which leaves each terminal at 10 a.m. The three new trains are distinctive in design. The coaches are painted a vivid tangerine color and contain a chair car compartment. No extra seat charge is made on these trains. They are to be known as the Peoria-St. Louis Fliers.

The de luxe parlor car train is known as the Capitol Limited. It continues to serve meals à la carte and has such refinements as library and club sections, observation platform and reserved parlor chairs.

On the Springfield-Decatur-Champaign-Danville division four fast trains have been placed in service each way daily instead of two. These trains make the trip from Springfield to Danville in 4 hours and 15 minutes.

Three fast limited trains have been placed in service each way daily connecting Peoria, Bloomington and Decatur, whereas two have been on the schedule.

Another step forward is marked in the sleeping car service started on the route connecting Champaign, Decatur and St. Louis. The sleeping car leaves Champaign on Monday, Wednesday and Friday nights, and returning leaves St. Louis on Tuesday, Thursday and Sunday nights. It is named the "Illini," in deference to the famous university at Champaign-Urbana.

Service between suburban points and their nearest terminal cities has been augmented with the addition of "turn-around" trains, notably between Morton and Peoria; Danvers, Heyworth and Bloomington, and Riverton and Springfield.

No changes are made on the Ridgefarm or Catlin divisions, but train time has been altered on trains on the Homer, Mechanicsburg and Hillsboro divisions.

The improvements in service were advertised widely in the newspapers in the territory in which the company operates.

## Another Paper Sees the Injustice of the Paving Charge

"As a matter of equity it does not seem fair that the International Railway should still be compelled to maintain the pavement and make repairs to the street between its rails," says the Buffalo *Evening Sun* in commenting on the franchise of the railway which provides that the company maintain the pavement between its tracks in the city. The newspaper says, "It is a heritage of horse-car days," and adds:

> At the time when this system of street paving was adopted there was one or more perfectly good reasons for the practice: First, because the street car horses had to have a non-slippery surface on which to travel while drawing the cars with their heavy loads; second, because much of the heavy trucking in the city was hauled by horses that also required such a surface in bad weather.
>
> Today this strip of rough stone pavement is an anachronism. The street cars are not drawn by horses and most of the heavy trucking is done by auto trucks. It is time that this historical rough strip was abandoned and that asphalt should replace stone as fast as new tracks are laid or important repairs are necessary. Those stone-paved surfaces are no more needed on the street with car lines than they are on any other comparatively level streets.
>
> It may not be popular to say it, but it also is true that with the passing of the horse-drawn cars and the substitution of trolley-driven cars, all real reason has passed for saddling on the street car company the keeping up of the pavement between the tracks and along their outer rails.
>
> It is true that the International Railway's franchise imposes this requirement on it—and the company has not been considerate enough of the Buffalo public to make a proposal to relieve it of part of its burden generally acceptable.

**New Safety Laws Urged.**—Amendment of the traffic law to provide for the full stop of all street cars before crossing arterial highways will be urged by City Commissioner Pier at an early meeting of the City Council of Portland, Ore. At present cars are not obliged to stop at the "full stop streets" and this is said to be confusing to motor drivers. Commissioner Pier has been investigating the matter and reports that in his belief many of the accidents in which street cars and motor cars figure are due to failure of street cars to come to a full stop at the busy arterial highway crossings.

# News Notes

**Tramway Wants Increased Fare.**—The Denver & Crown Hill Railway, a branch line of the Denver Tramway, operating from a junction of the city lines to the Crown Hill Cemetery, a distance of about 1 mile, has petitioned the State Public Utilities Commission for permission to raise the fare from 5 cents to 8 cents, effective on Dec. 1. It is claimed that the road has operated at an annual deficit of between $5,000 and $8,000. Only one car operates on the line.

**Must Continue Bus Service.**—The Pennsylvania Public Service Commission recently disposed of an application to discontinue bus service. The York Railways, York, Pa., organized the York Transit Company to supplement railway service with buses. After eleven months operation an application to discontinue the bus service was filed. It had yielded $3,011, which was $5,717 less than it had cost. The commission held that the service was necessary and denied the application for permission to quit, giving the company the right to renew its application, however, if, after three or four months trial of rates considered by the company to be sufficient to yield operating expense and fair return, it should be found that the service could not be operated profitably. The old rates averaged 4 cents a mile.

**Agitation Over One-Man Cars.**—Formal notice has been served upon the International Railway, Buffalo, N. Y., by the municipal authorities demanding immediate withdrawal of one-man cars. The city also has asked the Public Service Commission to take action. Herbert G. Tulley, president of the International, says one-man cars have come to stay.

**Petitions to Run Supplementary Buses.**—The Roanoke Railway & Electric Company, Roanoke, Va., has petitioned the State Corporation Commission for permission to establish a supplementary bus line. The company states that its appeal is based on an understanding of the public's "demand . . . for interurban bus transportation."

**Seeks to Enjoin Bus Operation.**—Parlor car service of the Iroquoise Trails Motor Coach Lines, Inc., between Rochester and Buffalo, N. Y., was halted on Nov. 21 when the Rochester, Lockport & Buffalo Railroad obtained a temporary restraining order, pending trial of an action in Supreme Court. The railway will sue for a permanent injunction on the ground that the bus company is operating in competition without permission from the towns and villages it serves and without a certificate from the State Public Service Commission.

**Railway Favored for Football Jaunts.**—The Michigan Electric Railway, Jackson, Mich., has called the attention of parents to the desirability of having their children travel to the high school and college football games by the company's interurban system rather than in automobiles. It draws attention to the fact that two serious mishaps have recently occurred near Jackson in such automobile jaunts. Athletic Director Mason of the Jackson public schools has taken a stand against boys traveling in automobiles to and from schools or to out-of-town events. He has arranged for special cars on the Michigan Electric Railway from Jackson to Grand Rapids for his team and any rooters who wish to accompany it. Special rates are granted, in such instances. The railway believes that at such times the excitement and natural exuberance over the coming events cause mishaps, and in that emergency the electric railway is the way of sureness and safety.

**Granted Bus Franchise.**—The Portland Electric Power Company, Portland, Ore., has been granted a franchise to operate a bus line on East Thirty-ninth Street, to connect with the railway lines. The bus line will be operated as a cross-town line. The franchise will run for six months.

**City Officials Sued.**—Claiming that her husband was killed by a trackless trolley on Victory Boulevard, Staten Island, March 10, 1923, Mrs. Eva Chrampanis has filed suit for $75,000 in the county clerk's office in St. George, Staten Island, against Mayor Hylan, the five Borough Presidents, Murray Hulbert, President of the Board of Aldermen, and Grover Whalen. This is the second time that Mrs. Chrampanis has brought suit in the matter. Following the accident she sued the city of New York and the case was argued before Justice Selah B. Strong in the March term of this year. Counsel for the city asked for a dismissal on the ground that since the trackless trolley on Staten Island was being operated without a franchise from the city of New York, the city could not be held responsible for the death of her husband. Justice Strong granted the request for dismissal. Arthur M. Simonson, attorney for Mrs. Chrampanis, then sought permission to lodge a complaint against individuals.

**New Railway in Prospect.**—Plans are under way for connecting Mariemont, east of Madisonville, with downtown Cincinnati, Ohio, by electric railway. Negotiations have been in progress for some time through which, if completed, the cars of the Cincinnati, Milford & Blanchester Traction Company will be brought over the tracks of the Cincinnati Traction Company to Cincinnati. B. H. Kroger, president of the Cincinnati, Milford & Blanchester Traction Company, said that the matter had been taken up with officials of the traction company and that plans had been discussed. Mr. Kroger said that plans are being held in abeyance until the new electric railway charter has been agreed upon. Recently the Cincinnati, Milford & Blanchester Traction Company purchased a strip of property in downtown Cincinnati which is being considered as a possible site for the new downtown terminal of the interurban.

**Wages Advanced Two Cents.**—Platform employees of the Rochester, Lockport & Buffalo Railway operating an interurban line between Rochester and Lockport, connecting at the latter city with the International Railway for Buffalo, have been granted a wage increase of 2 cents an hour after a conference between the management and James Largay, Utica, vice-president of the Amalgamated. The agreement ends a two-year dispute over wages which threatened a strike two weeks ago. The new scale became effective on Nov. 1.

**Eighty Buses in Service.**—During the past month the Pennsylvania Power & Light Company started bus service between New Castle and Sharon, Pa. This addition brings the total number of buses operated by the Republic Railway & Light Company, the controlling company, up to 23 in interurban service and 57 buses in city service.

**Seeks Advanced Rates.** — The Virginia Railway & Power Company has petitioned the States Corporation Commission for permission to increase its present fare from Richmond to Petersburg from 47 cents to 60 cents and to advance the ticket rate from 42 cents to 55 cents. Commutation rates under this petition would be raised from $ to $3.50 for a minimum distance and from $13.75 to $16.50 for the full trip. The petition was signed by President Wheelright. It said that the commission had found the value of the interurban division $1,210,000, and that earnings for the nine months ended Sept. 30, 1924, were $40,646 and for a similar period last year $36,869. The actual return on this valuation for the year 1923 was only 3.43 per cent, deducting the sum of $15,000 which the commission said was a proper charge to be made against the Richmond-Petersburg divisions for transfers to and from the interurban line.

**Will Repeal Bus Tax Ordinance.**—Acting on what it alleged was a refusal by the Duluth-Superior Traction Company to furnish bus service to residents in and between Allouez and Itasca suburbs of Superior, the City Commissioners have voted unanimously to repeal the city's bus tax ordinance, which provided a tax of $500 on each jitney placed in city service. The City Commissioners contend that when this ordinance was adopted it was the understanding of the City Commission that the railway would place a bus in service between these points.

**Complaint Dismissed.** — The California Railroad Commission has dismissed the complaint of the city of Piedmont against the Key System Transit Company, charging discrimination against the city of Piedmont in the matter of interurban fares. The defendant company has complied with the order of the commission to remove the discrimination. It is now operating interurban trains over an extension of the Piedmont line from Fortieth and Piedmont Avenue in Oakland to Oakland and Jerome, in Piedmont.

**Seeks Increased Fares.**—The Athens Railway & Power Company, Athens, Ga., has petitioned the Georgia Public Service Commission for permission to issue weekly passes for $1 and to increase cash fares from 7 cents to 10 cents. The company also wishes to sell books of tickets at the rate of two for 15 cents if the 10-cent cash fare is granted. Fares in Athens have been 7 cents since September, 1921.

# Financial and Corporate

## I. R. T. Reports $359,025 Deficit

### Net Corporate Income Increased by $1,202,972—Traffic Up on Subway and Manhattan Divisions

The net corporate income of the Interborough Rapid Transit Company, New York, N. Y., for the year ended June 30, 1924, was $1,071,177, against a net corporate deficit of $131,795 in 1923, or an increase of $1,202,972. The surplus at the end of the year was $391,534, compared with a deficit for the year ended June, 1923, of $524,783.

The number of passengers carried was 1,074,343,243, compared with 1,025,175,131 last year, an increase of 49,168,112. This was due to a gain of 38,282,756 on the subway division and a gain

COMPARATIVE STATEMENT OF INCOME ACCOUNT, YEAR ENDED JUNE 30

| | 1924 | 1923 |
|---|---|---|
| Gross operating revenue.. | $57,773,775 | $55,559,435 |
| Operating expenses.. .. | 33,841,415 | 34,392,508 |
| Net operating revenue. | $23,932,359 | $21,166,927 |
| Taxes.. .. | 2,763,529 | 2,662,310 |
| Income from operation. | $21,168,830 | $18,504,616 |
| Non-operating income.... | 402,762 | 573,850 |
| Gross income.. .. | $21,571,592 | $19,078,466 |
| Income deductions.. .. | 20,500,416 | 19,210,261 |
| Net corporate income for the year. .. .. | †$1,071,176 | *$131,794* |
| Add: | | |
| Surplus at beginning of year . | *524,783* | *524,866* |
| Profit and loss account net change during the year.... .. | *154,859* | 131,878 |
| Surplus or deficit at end of year*.. .. | †$391,534 | *$524,783* |

* Stated exclusive of accruals under contract No. 3 and related certificates payable from future earnings but with full deduction for sinking fund on first and refunding mortgage bonds, the payment of which is under the "Plan of Readjustment," postponed for ten years from July 1, 1921, provided an amount equal to such postponed sinking fund be expended for additions or improvements to the property.

† Stated exclusive of expenditures for maintenance in excess of contractual provisions aggregating $1,430,202, leaving a balance (deficit) after actual maintenance of $359,025 for the year.

Figures in italics show deficit.

of 10,885,356 on the Manhattan Railway division.

An expenditure of $5,909,509 was made during the year for additions, betterments and replacements. This amount included the company's contribution toward construction and equipment under contract No. 3 and the related certificates, completion of the multiple-unit car door control device on 1,378 subway cars and a considerable portion of the cost of installing multiple-unit car door control devices on 465 Manhattan division cars, also the cost of completing 100 subway steel trail cars put into use during the summer of 1923.

The increase in revenues from transportation for the year was $2,446,446. While the greater part of this gain was on the subway division, the Manhattan Railway division showed an increase of more than 3 per cent, most of which, according to the report, may be attributed to increased service and improvements in the condition of the cars and stations, together with increased patronage resulting from advertising. There was a decrease in the other operating revenue of $232,107, leaving a net increase in gross operating revenue of $2,214,339. This falling off in other operating revenue resulted from a decrease in the sale of power of $322,000, partially offset by an increase in advertising and rentals.

The cost of conducting transportation during the year was $959,588 less than the previous year, although the car-miles operated increased 7,310,000 and wage rates were 5 per cent higher.

It was necessary to expend for maintenance $1,364,464 more than in the previous year, to keep the property in a safe operating condition. Considering the actual maintenance expenditures the total expenses for operating and maintaining the property for the year were $35,271,618, compared with $34,829,706 in 1923. The increase in general expenses was $36,720 over the previous year, although the amount expended in the settlement of accident and damage claims showed an increase of $75,123, due largely to the necessary

STATEMENT OF INCOME DEDUCTIONS, YEAR ENDED JUNE 30, 1924

| | | |
|---|---|---|
| Gross income.. .. | | $21,571,592 |
| Rentals: | | |
| City of New York: | | |
| Interest on city bonds | $2,049,182 | |
| Sinking fund.. .. | 561,817 | $2,610,999 |
| Manhattan Railway: | | |
| Interest: | | |
| Consolidated mortgage 4 per cent bonds.. .. | $1,627,320 | |
| Second mortgage 4 per cent bonds.. | 180,920 | |
| Fixed rental—organization.. .. | 50,000 | |
| Dividend rental on capital stock.. .. | 2,723,877 | 4,582,117 |
| Total.. .. | | $7,193,116 |
| Interest and sinking fund charges—On securities issued by Interborough Rapid Transit Company: | | |
| First and refunding mortgage 5 per cent gold bonds: Interest.. $8,066,992 Sinking fund... 2,170,556 | $10,237,548 | |
| Ten-year 7 per cent notes—interest.. .. | 2,246,419 | |
| Ten-year 6 per cent notes—interest.. .. | 260,908 | |
| Equipment trust certificates, Series "A" —interest.. .. | 70,420 | 12,815,297 |
| Other deductions: | | |
| Sundry rents.. .. | $264,659 | |
| Interest on unfunded debt.. .. | 178,543 | |
| Interest on investment of depreciation reserve | 48,800 | 492,002 |
| Total income deductions.. .. | | $20,500,416 |
| Net corporate income.. .. | | $1,071,176 |
| Maintenance expenditures in excess of contractual provisions.. .. | | 1,430,202 |
| Balance (deficit) after actual maintenance.. .. | | $359,025 |
| Per cent expenses to earnings.. .. | | 58.57 |
| Passengers carried.. .. | | 1,074,343,243 |

postponement of the settlement of such cases during the past few years.

The net result of the operation of the Interborough system, after deducting the actual maintenance expenditures, shows an improvement over the previous year of $209,966. This figure is arrived at after deducting the Manhattan dividend rental of $1,013,877 in excess of the previous year, including a reserve of $233,877 to cover the amount of additional dividend rental from July, 1, 1922, to June 30, 1924, which might become payable to owners of Manhattan stock not agreeing to the plan of readjustment.

Following an order from the Transit Commission, under date of Aug. 22, 1923, directing the purchase of 100 additional steel motor cars for use in the subway division, arrangements were made for the purchase of these cars through an equipment trust, whereby 25 per cent of the cost, estimated at $3,000,000, was paid in cash and the balance through the issuance and sale of $2,250,000 of equipment trust certificates, bearing interest at the rate of 6½ per cent.

#### Buses as Adjunct to Railway

In his report to the stockholders Frank Hedley, president and general manager of the Interborough property, states that since the report was prepared several applications for franchises to operate comprehensive bus systems have been filed with the public authorities. He said that the Interborough's position was that there should be no extensions of existing bus lines, except as feeders for the rapid transit lines. He said the operation of buses over the routes contemplated in the franchise applications recently submitted would seriously affect the net revenues of the company and its ability to pay interest on the city's bonds issued for construction purposes. It was his idea that bus operation should be rendered as an adjunct to the rapid transit lines, in which the city is financially interested under the provisions of the existing contracts. He concluded by stating that 30 years ago the city adopted a policy of underground transportation, with ultimate municipal ownership, and that it should not now revert to a policy of 70 years ago of coach transportation with private ownership.

The accompanying tables show the income account of the company for the fiscal year ended June 30, 1924, compared with the year before, also the income deductions for the year ended June 30, 1924.

---

**Line to Be Reorganized.**—The Portsmouth, Dover & York Electric Road, Portsmouth, N. H., will be reorganized under the name of the Portsmouth, Kittery & Eliot Railway. The company will operate its cars from Kennard's Corner, Eliot, to Sea Point, Kittery. It is expected that service will start early in the new year. The incorporators include W. W. Sargent, president of the Fitchburg & Leominster Railway; Zelig Van Loan, E. A. Pierce, general superintendent of the Bellows Falls & Saxon River Railway, and Dr. Samuel Nason.

# St. Louis Plan Approved

### Terms Announced Under Which the Reorganization of United Railways Will Be Carried Out

Holders of the securities of the United Railways, St. Louis, Mo., and its subsidiary companies, were notified on Nov. 26 of the perfection of the plans for the reorganization of the company. With the exception of the first general mortgage 4s holders are instructed to deposit their securities with the respective depositories on or before Dec. 24. The general 4s are undisturbed by the reorganization plan. Under the terms of the plan a total of $41,296,000 of stock is eliminated, the amounts being $16,383,000 of preferred and $24,913,000 of common.

The reorganization is intended to terminate the receivership, bring about a fair adjustment of the respective interests of the various security holders, reduce the fixed charges to an amount safely within the earning capacity of the property, settle the litigation and controversies which have prevented reorganization of the properties, provide adequately for present and future capital requirements and place the property in a position to render the highest standard of public service. In particular, the reorganization is intended to prevent separation of the properties and to continue under one management all of the roads now comprising the United Railways system.

The new financial arrangement and agreement is dated Oct. 1, 1924. Under it the fixed charges of the company, including the sinking fund on the Suburban bonds, will be $1,927,000 as against $2,613,980 under the present organization.

The capitalization and annual charges after reorganization are estimated as shown in the accompanying table.

The proposed new capitalization is compared in the accompanying table with the obligations on the present outstanding securities of the company.

Holders of the bonds and stock of the company and its subsidiaries who have not already deposited their securities with their respective protective committees may become parties of the reorganization plan and agreement by depositing their securities with the depositories under their respective depository agreements.

Newman, Saunders & Company, Inc., New York, of which J. K. Newman, a member of the reorganization committee, is head, have agreed to form a syndicate of which it will be manager, to underwrite the 245,745 shares of new common stock to be offered the preferred and common stockholders of the present company.

PRESENT CAPITALIZATION AND CHARGES OF UNITED RAILWAYS

| Amounts outstanding | Bonds | Annual charges |
|---|---|---|
| $30,300,000 | United Railways Company first general 4s | $1,212,000 |
| 2,000,000 | St. Louis & Suburban first mortgage 5 (8) per cent | 160,000 |
| 4,500,000 | St. Louis & Suburban general 5s | 225,000 |
| 1,640,000 | Cass Avenue & Fairgrounds Railway first mortgage 5 (6) per cent bonds | 98,400 |
| 986,000 | Compton Heights, Union Depot & Merchants Terminal Railway first mortgage bonds | 59,160 |
| 1,474,000 | Lindell Railway Company first mortgage 5 (8) per cent bonds | 117,920 |
| 9,790,000 | St. Louis Transit Company improvement 5 per cent gold bonds | 489,500 |
| | Receiver's certificates | |
| 4,200,000 | Receiver's certificates Series B 6 per cent | 252,000 |
| | Total fixed charges | $2,613,980 |
| | Stocks | |
| 16,383,000 | United Railways preferred stock | 819,150 |
| 24,913,000 | United Railways common stock | ... |
| $96,186,000 | | $3,433,130 |

ESTIMATED CAPITALIZATION AND ANNUAL CHARGES AFTER REORGANIZATION

| | | Annual charges |
|---|---|---|
| $30,300,000 | first general mortgage 4s, undisturbed | $1,212,000 |
| 6,000,000 | first and refunding mortgage bonds or collateral gold notes of new company | 390,000 |
| 4,500,000 | first mortgage bonds of new Suburban | 225,000 |
| | Total interest charges | $1,827,000 |
| | Sinking fund of $100,000 annual for retirement of Suburban bonds | 100,000 |
| 53,845 | shares of new preferred 7 per cent stock | 376,915 |
| 343,645 | shares of new common stock of no par value | ..... |
| | Total obligations on securities | $2,303,915 |

## Chicago's Loop Has 1,200,000 People Daily

More than 1,200,000 persons pour into the loop district of Chicago every twenty-four hours, according to a traffic count made by the city's department of public service. Of the number more than 700,000 are carried by surface and elevated lines, buses and suburban steam lines. The figures were gathered by the department so that actual data might be had on a city's traffic problems for use in considering questions arising affecting pedestrians, motorists and street-car and elevated passengers might be settled on a definite basis with a regard for the greatest number.

The count showed that pedestrians numbering 182,011 came into the loop every day; 34,184 entered by commercial vehicles and 233,309 by passenger vehicles. The surface lines carried 475,237 persons and the elevated lines 189,905. Buses transported 74,000.

The figures for the loop-bound traffic of the surface and elevated lines are based on the average number of passengers carried a day during the first six months of the current year. The Chicago Traction and Subway Commission of 1916 had established, on the basis of an actual count, of all passengers carried by these lines, that of the 24-hour total surface lines traffic, 23 per cent was carried in or out of the loop, while of the total passengers carried by the elevated lines in 24 hours, 63 per cent are hauled to and from the loop district.

## Conspectus of Indexes for November, 1924

Compiled for Publication in this Paper by

**Albert S. Richey**
Electric Railway Engineer
Worcester, Mass.

| | Latest | Month Ago | Year Ago | Since War High | Since War Low |
|---|---|---|---|---|---|
| **Street Railway Fares*** 1913 = 4.84 | Nov. 1924 7.17 | Oct. 1924 7.15 | Nov. 1923 6.95 | May 1921 7.24 | May 1923 6.88 |
| **Street Railway Materials*** 1913 = 100 | Oct. 1924 148.5 | Sept. 1924 151.4 | Oct. 1923 169.9 | Sept. 1920 247.5 | Oct. 1924 148.5 |
| **Street Railway Wages*†** 1913 = 100 | Nov. 1924 220.7 | Oct. 1924 220.6 | Nov. 1923 216.4 | Sept. 1 '20 232 | Mar 1923 206.8 |
| **Steel—Unfilled Orders (Million Tons)** 1913 = 5.91 | Oct. 31 1924 3.53 | Sept. 30 1924 3.47 | Oct. 31 1923 4.67 | July 31 1920 11.12 | July 31 1924 3.19 |
| **U.S. Bank Clearings Outside N. Y. City (Billions)** | Oct. 1924 18.02 | Sept. 1924 15.90 | Oct. 1923 17.04 | Mar. 1920 18.54 | Feb. 1922 10.65 |
| **Business Failures** Number | Oct. 1924 1,574 | Sept. 1924 1,276 | Oct. 1923 1,608 | Jan. 1924 2,231 | Sept 1924 1,276 |
| Liabilities (millions | 45.89 | 26.93 | 75.17 | 122.95 | 26.95 |

| | Latest | Month Ago | Year Ago | Since War High | Since War Low |
|---|---|---|---|---|---|
| **Eng. News-Record** Construction costs 1913 = 100 | Nov. 1924 205.7 | Oct. 1924 207.6 | Nov 1923 229.9 | June 1920 273.8 | Mar 1922 162.0 |
| **U.S. Bur. Lab. Stat.** Wholesale Commodities 1913 = 100 | Oct 1924 151.9 | Sept. 1924 148.8 | Oct. 1923 153.1 | May 1920 247 | Jan 1922 138 |
| **Bradstreet's** Wholesale Commodities 1913=9.21 | Nov 1 1924 13.35 | Oct. 1 1924 13.00 | Nov 1 1923 13.14 | Feb. 1 1920 20.87 | June 1 1921 10.62 |
| **Dun's Wholesale** Commodities 1913 = 120.9 | Nov. 1 1924 193.7 | Oct 1 1924 190.9 | Nov 1 1923 191.8 | May 1 1920 263.3 | July 1 1921 159.8 |
| **U.S Bur. Lab. Stat.** Retail food 1913 = 100 | Oct. 1924 148.7 | Sept 1924 146.8 | Oct 1923 150 | June 1920 219 | Mar 1922 139 |
| **Nat. Ind. Conf. Bd.** Cost of living 1914 = 100 | Oct. 1924 165.0 | Sept. 1924 163.7 | Oct. 1923 164.1 | July 1920 204.5 | Aug. 1922 154.5 |

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population.

Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials.

†Beginning with this issue a slight change is made in the weighting employed in the electric railway wage index. This index represents on the base of 1923 = 100, the trend of maximum hourly wages of street and interurban railway platform men of about 100 of the largest companies in the United States. The weighting heretofore given to this index has been the number of passenger cars operated by the various companies. The weighting has now been changed to be in accordance with the number of trainmen (conductors, motormen and one-man car operators) employed by the various companies. Although the change is slight, it is thought the revised index is a more accurate measure of the trend in wages. Monthly index figures since January, 1923, on the old and new bases were published on page 787 of the issue of the paper for Nov. 1, 1924.

## Canadians Oppose Stopping Service on Toronto Radial

Engineers of the Hydro-Electric Commission of Ontario have been authorized to prepare a report for submission to the city of Toronto setting forth the earnings, value and other statistics of the Schomberg division of the Metropolitan Radial Railway in explanation of the commission's decision to suspend service over the road. It was also decided to notify the municipalities which are affected that under the radial agreement they have the right to acquire the line if they so choose. Apparently the Schomberg division must go unless the municipalities which it serves choose to take over its operation.

King Township residents declare that the proposal of the commission to scrap the Schomberg division would bring economic destruction to the several villages which it serves. In consequence township officials are preparing a campaign of vigorous resistance to the project. York County Council will be asked by the township to join with it in a protest to the Hydro commission. In the event of this failing to bring results an appeal may be made to the Dominion Railway Commission to have the Schomberg line taken into the national system.

## Employees Handle Stock Sale in Birmingham

Approximately 4,000 shares of preferred stock of the Birmingham Electric Company, paying 7½ per cent interest, were sold to Birmingham, Ala., people during the first week of a drive to sell an issue of 20,000 shares of the stock locally. The sale started formally on Nov. 10 and is being handled by employees of the company. Employees bought 2,400 shares of the stock before the formal offering to the public and more than 70 per cent of the employees subscribed, it is stated. The stock, which is no par value stock, is being sold at $97 per share and is callable at $110 per share. The proceeds of the sale are to be used in gas and electric extensions.

As an advertising feature in connection with the stock sale four cars of the company were painted white with advertisements of the stock sale in large black letters on them. The ads read "Invest in Our Preferred Stock. It Pays 7½ per Cent. It's Safe. Our Employees Sell It."

In addition to the white painted street cars, newspaper and billboard advertising as well as posters in all street cars are being used.

**New Third Avenue Director.**—At a meeting of the Third Avenue Railway, New York, on Nov. 12, William Carnegie Ewen was elected a director of the company. He succeeds Harry Bronner of Blair & Company, New York, resigned. Mr. Ewen is an investment banker with offices in New York. He has in the past specialized in New York city traction securities and is regarded as being unusually well informed with respect to the history of the various companies in New York City and on the possibilities of the territory in which they operate.

**City Wants Payments on Time.**—At a conference with Mayor Kendrick, his cabinet, the Council and the Transit Commission, T. E. Mitten of the Philadelphia Rapid Transit Company announced that his company stood ready to carry the interest and sinking fund charges, but he asked that during the early operation of the new subway the amounts to be paid by the company be less than during the later years of the arrangement. He added that the company eventually would pay the equivalent of all interest and sinking fund charges of the entire 50 years. Both the Mayor and president of the Council declared that such procedure would impair the city's improvement program by tying up some of its borrowing capacity. A member of the Council's finance committee named by the Mayor as one of the four city representatives to confer with the company's officials on details of the Chestnut Street subway agreement said that the city must insist that the company be not permitted to interfere with the city's development program by slowness in taking over the full yearly burden.

**Deficit in September.**—For the month ended Sept. 30, 1924, the Municipal Railway of San Francisco, Cal., reports total receipts of $270,881 and total operating expenditures of $203,722. The excess of receipts over expenses for the month was $67,160. After the consideration of reserves, amounts for depreciation and interest charges, the net deficit from operations for September was $454.

**Return Less than 1 per Cent in Mobile.**—The financial statement of the operations of the Mobile Light & Railroad Company, Mobile, Ala., for the year beginning Oct. 1, 1923, and ending Sept. 30, 1924, made in connection with a recent abandonment petition shows railway revenue of $747,801. Operating expenses and taxes were $715,770; net $32,031; bond interest, $67,595; other interest, $900; total interest, $68,495; deficit after interest, $36,463; paving assessment, $2,216; deficit after paving assessment, $38,680; sinking fund, $25,000; deficit after sinking fund, $63,680. Including operation of the Chickasaw line, which was not valued by the Public Service Commission, the net income was 0.85 per cent on the valuation of $3,765,369, it was stated in the company's recent plea for abandonment of some lines.

**Buses Meet With Losses.**—Bus service maintained by the Seattle Municipal Railway in connection with the car lines is a financial loss to the railway system, Superintendent D. W. Henderson reported to the City Council recently. During the first nine months of 1924 the loss amounted to $20,125. The Council has before it an ordinance appropriating $17,000 to purchase two buses for operation on Empire Way, and Superintendent Henderson recommends against such a move, stating that at least three buses would be required, involving an initial investment of $25,000.

**Prior Preference Stocks Offered.**—A syndicate including Otis & Company is offering at $92 per share and accrued dividend to yield 7.61 per cent, $4,000,000 of the 7 per cent prior preference stock of the Continental Gas & Electric Corporation. This company is presently to be a subsidiary of the United Light & Power Company of Grand Rapids, Mich. The United Light & Power Company, through a subsidiary, has recently contracted to purchase more than 75 per cent of the common shares of the Continental Gas & Electric Corporation. The Continental Gas & Electric Corporation is a large utility holding company which controls among other companies the Columbus Railway, Power & Light Company and the Kansas City Power & Light Company.

**Third Quarter Better Than a Year Ago.**—For the quarter ended Sept. 30, 1924, the United Traction Company, Albany, N. Y., received in transportation revenue $687,125, against $696,940 for a similar period a year ago. Revenue from other railway operations for the same quarters was $20,435 and $22,434 respectively. The total operating expense for the third quarter of this year was $631,987. The net surplus was $75,574. After the consideration of taxes the operating loss was $10,256. The operating loss for a similar period last year was $61,960. The net corporate loss for the third period of 1924 was $130,975. The net loss for the year, up to the close of the September quarter was $205,986. This is $12,452 less than the net loss for the first three quarters of 1923. For the nine months of 1924 the company collected 110,091 fewer passenger fares than for a similar period in 1923. For the first nine months in this year the company operated 3,945,745 car-seat-miles more than for the first nine months one year ago. The number of car-seat-miles operated for the quarter this year was 64,218,392.

**Railway Appurtenances Sold**—The Southeastern Ohio Railway, operating between Crooksville and Zanesville, Ohio, was sold recently to Henry Goodman. He will dismantle the property. Officials say that bus lines depleted the railway income. Cars have not been running since last May. The likelihood of the abandonment of this 16-mile line has been referred to previously in the ELECTRIC RAILWAY JOURNAL.

**Income Increases.**—For the quarter ended Sept. 30, 1924, the New York State Railways, Rochester, N. Y., reports to the New York Public Service Commission a net income of $217,774, compared with $205,842 for the similar quarter in 1923.

**$7,900,000 Bond Issue on Account of Purchase.**—Although the final railway purchase award at Toronto, Ont., calls for $11,448,500, the issue of bonds by the city on account of the railway purchase is for $7,900,000, as the city has already paid $2,500,000 on account, and more than $800,000 is still owing the city by the company in percentages. The terms of the award and the plans looking toward the liquidation of the Toronto Railway have been referred to several times in recent issues of the ELECTRIC RAILWAY JOURNAL. A meeting has already been called having for its object the winding up of the affairs of the company.

# Personal Items

## Assignments Made in Westinghouse Railway Department

Important changes, involving four division sales managers, have been made in the railway department of the Westinghouse Electric & Manufacturing Company. W. R. Stinemetz, manager of the heavy traction division, and K. A. Simmon, manager of the light traction division, have been appointed assistants to the manager of the railway department. To fill their places, A. J. Manson, manager of the transportation division at New York, has been elevated to the managership of the heavy traction division, as noted in the ELECTRIC RAILWAY JOURNAL for Nov. 22, and E. A. Palmer, manager transportation division, San Francisco office, has been advanced to the managership of the light traction division.

Mr. Stinemetz was graduated from Lehigh University in 1893. He was first employed by the Chicago Telephone Company and the Brooklyn Edison Company. He entered the employ of the Westinghouse Electric Company in 1897, was electrical engineer for power houses of the Third Avenue Railroad, New York, in 1899 and in 1900 was employed by the Westinghouse agents in Mexico. In 1901 he worked on the electrification of the Boston Elevated Railway and later launched the single-phase road of the Atlanta Northern Railroad. He then spent two years supervising the installation of single-phase railroads in France for the French Westinghouse Company and still later was engaged in installing the electrical equipment in the power house which supplied light, heat and power to the United States Capitol. In 1913 he was employed as a commercial engineer in the railway department of the Westinghouse company and several years ago was made manager of the heavy traction division of the railway department.

Mr. Simmon entered the employ of the Westinghouse company upon his graduation from the University of Minnesota in 1905. He attracted attention through the development of train-heating boilers for the New Haven locomotives. Railway control was his special work for some time and he became head of the railway control section of the railway engineering department in 1914. Four years later he became section engineer in charge of light traction motors and control in the railway engineering department. In 1921 he was appointed manager of the light traction division.

Mr. Manson's career was reviewed in the issue of the ELECTRIC RAILWAY JOURNAL for Nov. 22.

Mr. Palmer served with the Public Service Railway, New Jersey, upon his graduation from Cornell University in 1909 and was appointed assistant superintendent of the Plank road shops in 1911. Three years later he was made division master mechanic of the Central Division in Elizabeth, N. J. He held this position until 1916, when he entered the employ of the American Brake Shoe & Foundry Company as mechanical expert. He was engaged by the Westinghouse company in 1917 and was assigned to the railway department of the San Francisco office.

T. R. Langan, manager of the transportation division at the Buffalo office, has been appointed manager of the transportation division at the New York office, to succeed Mr. Manson.

## Mr. Ainey Heads Commissioners

### Chairman of Pennsylvania Body Elected President of National Body at Phoenix Meeting

W. D. B. Ainey was elected president of the National Association of Railway & Utility Commissioners at the recent annual convention in Phoenix, Ariz.



W. D. B. Ainey

Mr. Ainey is chairman of the Public Service Commission of Pennsylvania. He was appointed to that body by Governor Brumbaugh in 1915 and three months later he was made chairman. Mr. Ainey performed the duties of this office so capably that in 1917 he was reappointed for a 10-year term.

Mr. Ainey is very well known among utility men operating outside of his own state. He has been a frequent attendant at the conventions of the utility managers and was one of the speakers at the Midyear Meeting of the American Electric Railway Association in Indianapolis in 1922. His subject at that time was "A Commissioner's Viewpoint on Some Electric Railway Problems." According to Mr. Ainey, it is in the management and in the management alone that there is to be found the solution of the utility problems of the country. He has said publicly that in so far as the public utilities are concerned it should be the policy of the law not to permit managerial responsibility to be avoided, but that responsibility without authority to make it self effective is vain.

Mr. Ainey's principal interest lies, of course, in Pennsylvania, but he has long been a national figure. He was elected to Congress in 1911 and was there four years as a member of the Sixty-second and Sixty-third Congress. His election to this office was a tribute of his constituents toward the man. That his legal attainments have been given wide recognition is evidenced by the numerous occasions on which he has served as a delegate to international gatherings, including the Inter-Parliamentary Conference in Geneva, Switzerland, in 1912 and the Hague Conference in 1913, where he was made secretary of the Japanese-American groups of parliamentarians. In 1914, on the invitation of the Imperial Parliament, he visited Japan as a delegate from the United States.

Mr Ainey is a native of New Milford, Pa. He was graduated from the law school of Lehigh University and was admitted to the bar in 1887.

## Duties Reassigned in Schenectady

Changes in the personnel of the Schenectady Railway, Schenectady, N. Y., include the names of Messrs. Witherwax, Nellis and Palmatier.

C. J. Witherwax, for some years past connected with the company as general passenger and freight agent, has resigned his position, effective Nov. 24, to engage in other business. When he took over the management of all special car movements, excursions and the investigation of irregularities in service about ten years ago his office was a new one with the company. Later he was appointed claim agent. Prior to his connection with the railway he was associated with the Schenectady Illuminating Company and the Mohawk Gas Company.

J. G. Nellis, who was appointed superintendent of the Schenectady Railway on Oct. 15, 1924, takes charge of the traffic department in addition to his other duties, vice C. J. Witherwax, resigned. Before going to Schenectady Mr. Nellis had been superintendent of the Auburn & Syracuse Electric Railroad and prior to that a division superintendent with the Fonda, Johnstown & Gloversville Railroad at Amsterdam, N. Y. The activities of both Mr. Witherwax and Mr. Nellis have been referred to previously in the ELECTRIC RAILWAY JOURNAL.

Frank Palmatier, who for many years past has been superintendent of power for the Schenectady Railway, has had his duties enlarged so as to have charge of both power and overhead lines.

**Douglass Ford**, superintendent of the North Branch Transit Company, Bloomsburg, Pa., has resigned, effective Dec. 1, to become general manager of the Trenton, Bristol & Philadelphia Street Railway, which is in process of merger with the Frankford, Tacony & Holmesburg Street Railway and the Pennsylvania & New Jersey Railway. The headquarters will be located at Bristol, but may be moved when the merger is completed.

# Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

## Hoover Reviews Economic Progress

Outstanding features of the fiscal year ended June 30, 1924, were, according to Herbert Hoover, Secretary of Commerce, first, the advance in agricultural prices, which have lagged behind industrial prices for the last four years; second, the beginning of sound economic policies in German reparations, leading to a hopeful measure of economic recovery in Europe, and, third, the recovery of our own industry and commerce, great stability of prices, high production, full employment, expanding foreign trade and prosperity throughout the business world.

A slight slackening in production at the end of the year is indicated by the fact that the index for manufacturing output for June was 15 points below the average for the fiscal year, that for railway ton-mileage was 13 points below, for building contracts 6 points and for employment in factories 7 points below. Subsequent recovery is shown by the September indexes, which for manufacturing production stood thirteen points higher than in June, for mineral production nine points and for forest production one point higher.

## Financing Machinery Purchases

A new method of financing the purchase of machinery has been developed by the Industrial Equipment Corporation of America, New York City. The proposed plan resembles in many ways railway equipment trust financing. Certain kinds of machinery are standard with certain industries and possess a substantial resale value. Figures obtained from dealers in second-hand machinery indicate that the cost of removing such machinery does not average more than 5 per cent of the original cash value. Moreover, the rate of depreciation on such machinery is not particularly high. These factors have made possible the new financing arrangement.

Under the usual railway equipment plan the equipment is purchased from a manufacturer and either leased under the Philadelphia plan or sold under the conditional sale plan. The user pays a sufficient rental to meet the face value and dividends in the first case, or the maturing principal and interest in the second case, as they become due. Title to the equipment is vested in a suitable trustee during the life of the trust and each unit of equipment bears evidence of the ownership of the trustee in the form of a metal plate or some other conspicuous designation.

In financing the purchase of machinery the lease plan will be the procedure employed. Through the application of this method there is no possibility of the borrower obtaining title to any of the equipment pledged. Depreciation can readily be taken care of through an arrangement of serial maturities during the life of the trust.

This idea is not entirely new as purchases of other than railway equipment have been financed in the past in a similar manner. In fact, the beginning of the so-called railway equipment financing was not accomplished by a railway company at all, but is said to have taken place about 1845 when the Schuylkill Navigation Company desired to purchase some barges. Other instances of the application of this principal to the purchase of other material than locomotives and cars have occurred at various times. Machinery has been sold on the conditional sale plan to manufacturers and other types of industrial improvements have been financed through the recording of chattel mortgages and the issuance of serial installment payments against them. These transactions, however, have been more or less individual in nature and no successful effort has heretofore been made to develop the broad possibilities of the project as conceived by the organizers of the present corporation.

## Lumber Prices Have Doubled in 50 Years

An interesting fact in connection with average lumber prices during the past 50 years is that between 1874 and 1904 there was comparatively little variation. Beginning in 1905, however, there was a steady rise, interrupted only by one marked recession, until 1920, which was the peak year. Then followed a slight decline, but the average so far for 1924 is almost as high as for 1920.

The lumber prices shown in the accompanying table from 1874 to 1909, inclusive, are for long-leaf yellow pine boards, 1x12 in.; from 1910 to date for long-leaf yellow pine timbers, 3x12 in.; all per thousand feet, board measure, in approximately 20-ft. lengths at New York, N. Y.

## Metal, Coal and Material Prices

| Metals—New York | Nov. 25, 1924 |
|---|---|
| Copper, electrolytic, cents per lb. | 14.00 |
| Copper wire base, cents per lb. | 16.25 |
| Lead, cents per lb. | 8.80 |
| Zinc, cents per lb. | 7.25 |
| Tin, Straits, cents per lb. | 54.50 |
| **Bituminous Coal f.o.b. Mines** | |
| Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons | $4.275 |
| Somerset mine run, Boston, net tons | 2.075 |
| Pittsburgh mine run, Pittsburgh, net tons | 1.875 |
| Franklin, Ill., screenings, Chicago, net tons | 1.475 |
| Central, Ill., screenings, Chicago, net tons | 1.30 |
| Kansas screenings, Kansas City, net tons | 2.30 |
| **Materials** | |
| Rubber-covered wire, N. Y., No. 14, per 1,000 ft. | $6.25 |
| Weatherproof wire base, N. Y., cents per lb. | 17.25 |
| Cement, Chicago net prices, without bags | 2.20 |
| Linseed oil (5-lb. lots), N. Y., per gal. | $1.10 |
| White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots | 9.152 |
| Turpentine (bbl. lots), N. Y., per gal. | 0.81 |

In 1912 pine lumber prices had reached a point not touched again until 1918. The slump, which occurred meantime, reached the lowest point between 1914 and 1915. It was caused by the opening of the Panama Canal, when Douglas fir shippers on the West Coast could send the lower priced lumber through to the Atlantic seaboard in competition with Southern pine.

| Year | Price | Year | Price |
|---|---|---|---|
| 1874 | $26.00 | 1900 | $24.50 |
| 1875 | 21.00 | 1901 | 17.50 |
| 1876 | 21.00 | 1902 | 21.00 |
| 1877 | 20.00 | 1903 | 23.50 |
| 1878 | 20.00 | 1904 | 21.50 |
| 1879 | 20.96 | 1905 | 24.92 |
| 1880 | 19.00 | 1906 | 29.33 |
| 1881 | 19.00 | 1907 | 30.50 |
| 1882 | 19.00 | 1908 | 30.50 |
| 1883 | 19.00 | 1909 | 33.04 |
| 1884 | 19.00 | 1910 | 36.00 |
| 1885 | 18.66 | 1911 | 36.00 |
| 1886 | 19.00 | 1912 | 40.00 |
| 1887 | 19.00 | 1913 | 35.25 |
| 1888 | 16.75 | 1914 | 29.50 |
| 1889 | 20.31 | 1915 | 27.75 |
| 1890 | 21.75 | 1916 | 32.62 |
| 1891 | 18.00 | 1917 | 37.33 |
| 1892 | 18.50 | 1918 | 42.66 |
| 1893 | 8.50 | 1919 | 50.87 |
| 1894 | 18.50 | 1920 | 63.73 |
| 1895 | 16.92 | 1921 | 48.16 |
| 1896 | 16.42 | 1922 | 47.05 |
| 1897 | 16.44 | 1923 | 55.22 |
| 1898 | 15.75 | 1924 | 58.00 |
| 1899 | 16.25 | | |

## Growing Machine Tool Market

Machine tool makers are beginning to visualize the market ahead for them among the electric railways now operating buses. A good market exists for machine tool equipment of a type not now needed in the strictly railway shop. Some 2,000 buses are now being operated by the railways, and the number is growing rapidly. Garage installations of sizes varying from that needed for taking care of repairs on a few buses to that for several hundred are of almost daily occurrence.

In these shops in varying degree there will be installed lathes, drill presses, brake relining machines, chain hoists, cylinder boring and honing tools, portable drills and grinders, ball bearing jacks, gear type jacks, heavy duty dolly jacks, universal bench saws, wheel pullers for light duty and wheel pullers for heavy duty. This list includes some things that are not machine tools in the strictest sense, but all come under the general head of labor-saving machinery.

Each extension of the use of the bus means a direct need for the installation of machine tools by the railways. The electric railways are not equipped with the types of machine tools needed for garage work, even if they were inclined to attempt to turn their present equipment to such use. They must buy new equipment of one kind or another.

Moreover, the present is a most propitious time for just such buying. For a long time now the machine tool market has been more or less flat. True, it is improving, but when a large company like Niles-Bement-Pond feels called upon for the first time since 1899 to pass the payment of the dividend on its preferred stock a pretty good criterion is furnished of the extent of the period of readjustment through which the machine tool industry has been passing since the war. The management very frankly stated publicly that the business had not been profitable for the last three years.

## Burned Carhouse to Be Rebuilt

On Nov. 21 fire destroyed the carhouse and 10 cars of the Schuylkill Railway, located at Girardville, near Mahonoy City, Pa., with a loss of $150,000. The fire for a time threatened the entire plant of the company and interrupted trolley service throughout the northern end of the county for 5 hours. It has been announced that the buildings will be rebuilt. The company is considering the question of replacing the rolling stock which was destroyed.

## *Rolling Stock*

**Illinois Central Railroad** has decided on certain details of the 215 new cars which it has ordered, as mentioned in ELECTRIC RAILWAY JOURNAL for Nov. 22, page 905. Of this order 130 will be motor cars built by the Pullman Car & Manufacturing Company and 85 will be trailers built by the Standard Steel Car Company. General features of the motor cars are given in the accompanying table.

| | |
|---|---|
| Builder of car body | Pullman Company |
| Type of car | Passenger motor |
| Seating capacity | 84 |
| Estimated weight: | |
| Car body | 57,000 lb. |
| Trucks | 26,000 lb. |
| Equipment | 35,000 lb. |
| Total | 125,000 lb. |
| Bolster centers, length | 47 ft. 9 in. |
| Length over buffers | 72 ft. 7½ in. |
| Truck wheelbase | 8 ft. 0 in. |
| Width over all | 9 ft. 9½ in. |
| Height, rail to roof | 13 ft. 0 in. |
| Body | Steel and aluminum |
| Interior trim | Aluminum |
| Headlining | Agasote |
| Roof | Monitor |
| Air brakes | Westinghouse type PS |
| Control | General Electric type PC |
| Destination signs | Hunter |
| Gears and pinions | With motors by manufacturer |
| Journal bearings | Plain |
| Lightning arresters | General Electric |
| Motors | Westinghouse and General Electric specials* |
| Seating material | Rattan |
| Slack adjuster | American |
| Trolley | Pantograph |
| Wheels | Rolled steel 33-in. |

*Motors—inside hung 4 per car—250 hp. two motors in series on 750 volts.

The trail cars will differ from the motor cars in weight and in size of wheels. Estimated weights for these cars are as follows: Car body, 57,000 lb.; trucks, 26,000 lb.; equipment, 1,000 lb.; total, 84,000 lb. Trucks will be built by the Commonwealth Steel Company and will be equipped with 33-in. rolled steel wheels. Additional details concerning these cars and the motor cars will be published as soon as the company has decided upon them.

**Connecticut Company, New Haven, Conn.,** has just received four White buses.

**Pittsburgh Railways, Pittsburgh, Pa.,** last spring let a contract to the Standard Steel Car Company for the construction of 125 cars, as mentioned in the ELECTRIC RAILWAY JOURNAL, issue of May 10, 1924. These are now being built at the plant of the Osgood-Bradley Car Company, Worcester, Mass., for the account of the Standard Steel Car Company.

**Grays Harbor Railway & Light Company, Aberdeen, Wash.,** recently purchased two double-truck light-weight safety cars, representing an investment of $25,000, and completing the $60,000 improvement which the company has made in 1924. The cars were built by the American Car Company of St. Louis, and each has a seating capacity of 52. They will be used to meet the traffic demands on the line between Aberdeen and Hoquiam.

**Tennessee Electric Power Company, Chattanooga, Tenn.,** includes in its budget for 1925 $100,000 to be expended on track improvements in Chattanooga and the reconstruction of rolling stock. A large part of this amount will be used to rebuild 30 of the most modern cars now in service. These will be equipped with complete safety car service.

**Illinois Power & Light Corporation, Chicago, Ill.,** has placed an order with the Yellow Coach Manufacturing Company for six type Z, 29-passenger, single-deck buses. These buses will have 6-cylinder engines and will be used in the city service at Peoria, Ill.

**San Antonio Public Service Company, San Antonio, Tex.,** has purchased one type Z, 4-cylinder, 29-passenger, single-deck bus from the Yellow Coach Manufacturing Company.

**Department of Street Railways, City of Detroit,** has received offers from three bus manufacturers who are willing to supply buses on the rental plan proposed by the city. These are Dodge Brothers, Yellow Coach Company and Mason Motor Truck Company.

## *Power Houses, Shops and Buildings*

**Grand Rapids Railway, Grand Rapids, Mich.,** has awarded the contract to F. W. Burgstahler & Sons, Grand Rapids, to rebuild its Hall Street carhouse, which was recently destroyed by fire. The general contract price is given at $33,450.

## *Track and Line*

**Los Angeles Railways, Los Angeles, Cal.,** has reconstructed Central Avenue track from Fourteenth Street to Slauson Avenue.

**Chicago Surface Lines, Chicago, Ill.,** has opened up its 1½-mile extension to the Hegewisch, Ill., plant of Henry Ford. The South Chicago Chamber of Commerce took over the sale of bonds covering the cost of the extension. The new line runs through Prairie on Torrence Avenue from 112th Street to 124th Street.

**Boston Transit Department** on Nov. 25 opened bids for the building of the first section of the work of making the Shawmut Avenue branch of the New York, New Haven & Hartford Railroad into a branch of the Boston Elevated Railway. This section includes the extension of the Dorchester subway at Andrew Square and the building of an incline to the New Haven tracks. The contract has not yet been awarded, but the bids are as follows:

| | |
|---|---|
| Reynolds Brothers, Inc. | $1,074,295 |
| Simpson Brothers Corporation | 1,033,520 |
| C. & R. Construction Company | 1,019,930 |
| Martin F. Gaddis | 1,013,640 |
| A. G. Tomasello & Son | 991,460 |
| Coleman Brothers, Inc. | 969,530 |

## *Trade Notes*

**Lindsley Brothers Company, New York City, N. Y.,** pioneer operators in the Northwest since 1896 in Western red cedar poles, has recently established a New York office at 150 Nassau Street, in charge of Walter E. Mitchell as Eastern representative. Mr. Mitchell has been engaged in the pole business in the East since 1904.

**Gibb Instrument Company, Bay City, Mich.,** has changed its name to Gibb Welding Machines Company. This is a change in name only and denotes no change in organization. As the company no longer makes instruments, but is engaged exclusively in the manufacture of electric welding and heating machines, the new name was adopted as more exactly descriptive of the product.

## *New Advertising Literature*

**Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.,** has just issued a new edition of its publication "Cars and Car Equipment." This is a 20-page book, 8½ in. x 11 in., resembling in a general way the book published under the same title in 1920 by this company. Service performance, general data, weights, dimensions and information on electrical equipment and mechanical equipment, together with photographs and floor plans, are included for fifteen different cars. These include the light-weight cars of the Boston Elevated, Eastern Massachusetts, Lewiston & Reedsville railways, the Cincinnati and Wheeling traction companies and the North Shore Line. Moderate-weight cars of the Brooklyn City Railroad, Los Angeles Railway, and New Orleans Public Service, Inc., are shown. Suburban and interurban cars pictured are those of the Monongahela-West Penn system, Ohio Valley Electric Railway, the Indianapolis & Cincinnati Traction Company. A multiple-unit car of the Chicago elevated is also included.

**American Rust Proof Company, New York, N. Y.,** has issued a 15-page pamphlet called "Rust and Rust Prevention." It describes the preservation of steel from rust by Vatu.

**Barber-Greene Company, Aurora, Ill.,** has issued an attractively illustrated 25-page pamphlet called "Snow Insurance." Detailed specifications of the Barber-Greene snow loader are included and stories of its successful operation in many cities in the country. In addition, the pamphlet explains the practical solution of snow removal, stressing the great cost to the merchant, the community and the street railways where snow is allowed to remain unremoved. It states that the record of the New York car lines shows that $1,000,000 was lost in fares in the winter storms of 1919.

**Ohio Brass Company, Mansfield, Ohio,** has issued an illustrated 30-page booklet called "Trackless Trolley." It contains descriptions of overhead materials, current collection equipment and bus equipment.

# You'd be surprised—

if somebody proved to you that your hand brakes are almost completely useless!

## *Make this simple test on your own cars—*

See what happens to your hand brake when there's enough slack in the brake shoes to require full piston travel in the air brake system. Unless your hand brake is capable of winding in a powerful lot of chain, it will just clog and do nothing.

Slack off the brake shoes on some car just for trial. See if you've really got any hand brake or not.

## Better be safe than sorry!

Read the illuminating article on the subject of hand brakes in the September 13th issue of *Electric Railway Journal*. Its tables and diagrams will make clear to you the reason why ordinary hand brakes often fail to hold the car just when they are most needed, i.e. when the air brakes for some reason become inoperative.

Compare the almost unlimited chain winding capacity of Peacock Staffless Brakes with any other type. No matter what condition of slack exists—Peacock Staffless Brakes will handle any amount of chain—*and stop the car.*



Peacock Staffless Brakes

**National Brake Co., Inc.**

**890 Ellicott Sq., Buffalo, N. Y.**

*Canadian Representative*

**Lyman Tube & Supply Company, Limited, Montreal, Canada**

# Bankers and Engineers


**Ford, Bacon & Davis**
Incorporated
**Engineers**
115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

**The J. G. White Engineering Corporation**
Engineers—Constructors
Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads
43 Exchange Place New York

**STONE & WEBSTER**
Incorporated
EXAMINATIONS REPORTS APPRAISALS
ON
INDUSTRIAL AND PUBLIC SERVICE PROPERTIES
NEW YORK BOSTON CHICAGO

**THE BEELER ORGANIZATION**
ENGINEERS AND CONSULTANTS
Traction-Traffic-Equipment-Power
COORDINATION OF SERVICE - IMPROVED OPERATIONS
INCREASED TRAFFIC—FINANCIAL REPORTS
APPRAISALS—MANAGEMENT
52 Vanderbilt Ave. New York City

**SANDERSON & PORTER**
ENGINEERS
REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS
RAILWAY, LIGHT and POWER PROPERTIES
CHICAGO NEW YORK SAN FRANCISCO

**ENGELHARDT W. HOLST**
*Consulting Engineer*
Appraisals, Reports, Rates, Service Investigation, Studies on Financial and Physical Rehabilitation Reorganization, Operation, Management
683 Atlantic Ave., Boston, Mass.

**ALBERT S. RICHEY**
ELECTRIC RAILWAY ENGINEER
WORCESTER, MASSACHUSETTS
REPORTS - APPRAISALS - RATES - OPERATION - SERVICE

**JOE R. ONG**
Consulting Transportation Engineer
*Specializing in Traffic Problems and in Methods to Improve Service and Increase Efficiency of Operation*
PIQUA, OHIO

**STEVENS & WOOD, INC.**
Design and Construction of Power Stations
Railroad Electrification, Industrial Plants
REPORTS AND APPRAISALS
*Management and Financing of Utilities and Industrials*
Mahoning Bank Bldg. Youngstown, O.
120 Broadway New York

**Dwight P. Robinson & Company**
Incorporated
Design and Construction of
*Electric Railways, Shops, Power Stations*
125 East 46th Street, New York
Chicago Youngstown Atlanta Philadelphia
Los Angeles Montreal Rio de Janeiro

**HEMPHILL & WELLS**
CONSULTING ENGINEERS
Gardner F. Wells Albert W. Hemphill
*APPRAISALS*
INVESTIGATIONS COVERING
Reorganization Management Operation Construction
43 Cedar Street, New York City

**DAY & ZIMMERMANN, INC.**
ENGINEERS
DESIGN - CONSTRUCTION - REPORTS
VALUATIONS - MANAGEMENT
NEW YORK PHILADELPHIA CHICAGO

**WALTER JACKSON**
*Consultant on* Fares and Motor Buses
Originator of unlimited ride, transferable weekly pass. Campaigns handled to make it a success.
143 Crary Ave., Mt. Vernon, N. Y.

The Most Successful Men in the Electric Railway Industry read the
**ELECTRIC RAILWAY JOURNAL**
Every Week

**Byllesby Engineering & Management Corporation**
208 S. La Salle Street, Chicago
New York Tacoma

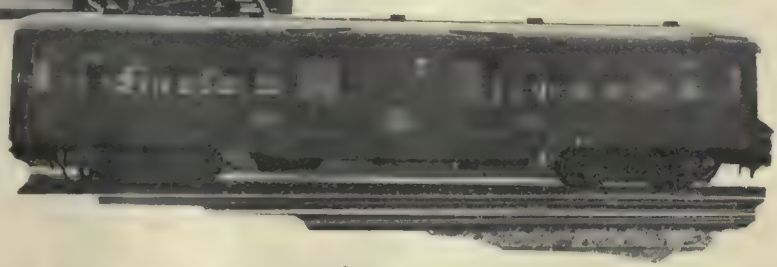
*In Europe as in America*

# HASKELITE AND PLYMETL WIN



Engineers everywhere are impressed with the unsurpassed properties of HASKELITE and PLYMETL and their great advantages for car body building. Roofs of Haskelite are stronger and lighter than other types, and are furnished in large sections. This reduces the joints to a minimum and adds to the stability of the body. PLYMETL, equal in strength to steel, has many times the heat insulating value, is much lighter and deadens sound. It resists indentation even better than steel.

Cars of the Cataluna Railways, Barcelona, Spain, have Haskelite roof linings and Plymetl wainscoting. These cars represent the most advanced practise in European car building and are comparable to the best types of American cars.



*Send for Booklet of Blue Prints and Engineering Data*

HASKELITE MANUFACTURING CORPORATION
133 W. WASHINGTON STREET, CHICAGO, ILL.

The Most Successful Men in the Electric Railway Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

C. B. BUCHANAN, President — W. H. PRICE, JR., Sec'y-Treas. — JOHN F. LAYNG, Vice-President

BUCHANAN & LAYNG CORPORATION

*Engineering and Management, Construction, Financial Reports, Traffic Surveys and Equipment Maintenance*

BALTIMORE, 825 Equitable Bldg. — Phone: Hanover 2142 — NEW YORK, 49 Wall Street

JAMES E. ALLISON & CO.
Consulting Engineers

Specializing in Utility Rate Cases and Reports to Bankers and Investors

1017 Olive St., St. Louis, Mo.

Transmission Line and Special Crossing Structures, Catenary Bridges

WRITE FOR OUR NEW DESCRIPTIVE CATALOG

ARCHBOLD-BRADY CO.
Engineers and Contractors — SYRACUSE, N. Y.

Bureau of Commercial Economics, Inc.
*Industrial Engineers*

Organization · Methods · Layout and Facilities
Public and Industrial Relations

72 West Adams Street · CHICAGO

THE P. EDWARD WISH SERVICE

50 Church St. NEW YORK — *Street Railway Inspection* DETECTIVES — 131 State St. BOSTON

HUMAN ENGINEERING

*Railway Audit and Inspection Company, Inc.*
*Fourth and Chestnut Sts., Philadelphia*

Boston, New Orleans, New York, Pittsburgh — BRANCHES — Baltimore, Chicago, Atlanta, St. Louis

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.



# Before you buy another bus

THE operator who buys new equipment today must be far more shrewd in judging values, far more careful in weighing competing arguments, far more cautious in finally deciding than ever before. And for several very good reasons:

**The bus business is increasing tremendously—not only by the year but from month to month.**

**The number of different buses manufactured and offered for sale has increased proportionately, giving the buyer a great variety from which to select.**

**The riding public is being educated to expect better traveling conditions and better service. People everywhere are taking more interest in the bus service offered to them.**

**Many of the buses now offered for sale were designed without an appreciation of present and future developments in public transportation. Even today they are an inadequate form of transportation. Within a short time they will be obsolete.**

**State and Federal legislation will soon be put in force to regulate the operation of buses. This legislation will have as its most important object the protection of public highways.**

Before you buy another bus be sure to make a thorough comparison of the relative merits of four wheel and six wheel vehicles.

Send for SAFEWAY Catalog and folder S1

THE SAFEWAY

MADE BY THE SIX WHEEL COMPANY



# —be sure you are right

This company believes that SAFEWAY Six Wheel vehicles are infinitely superior to those equipped with only four. The United States Bureau of Roads, an impartial observer, interested only in highway conservation, has proved that six wheel construction reduces dead weight pressure and impact shocks by fully 50 per cent.

Six years of actual operation, over all types of roads from coast to coast, has proved that vehicles equipped with six wheels will outlast those equipped with only four wheels.

It has been proved that six wheel construction provides a definite protection against skidding and side sway. It provides greatly increased braking facilities. It provides riding comfort which no four wheel vehicle may hope to attain. It insures a worthwhile reduction in operating and maintenance expense.

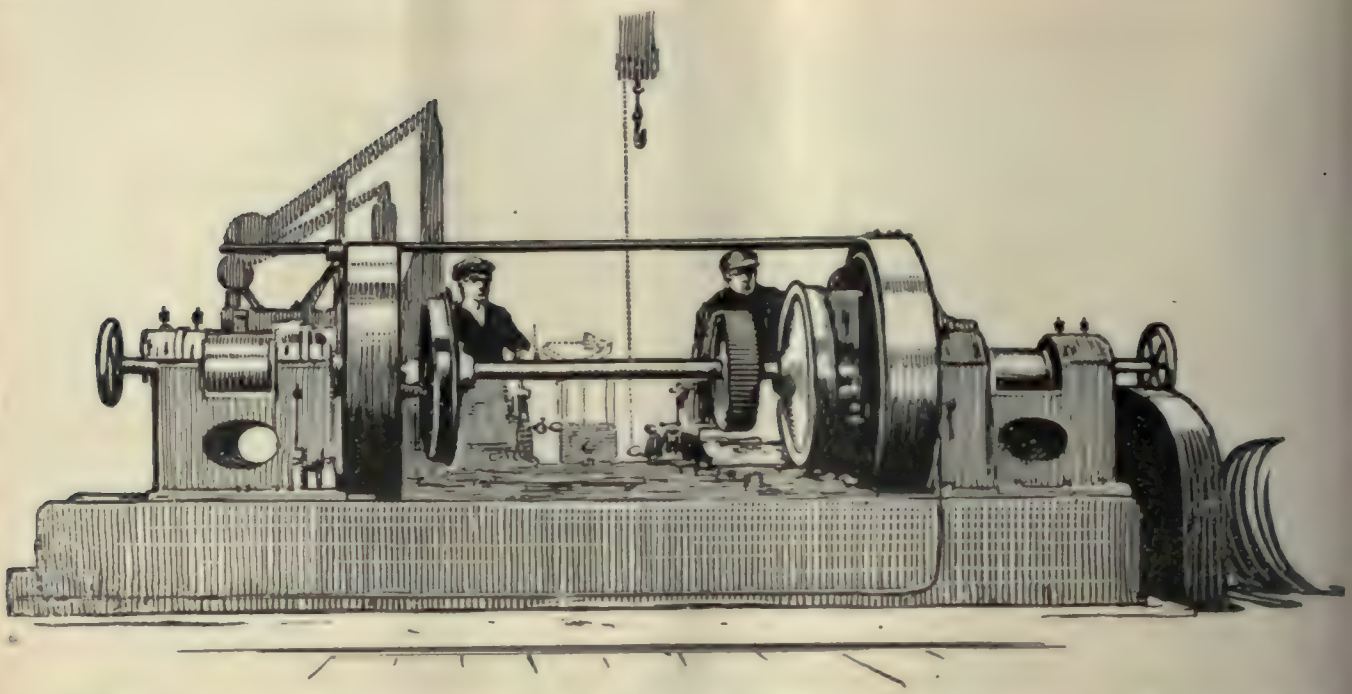
It is our prediction that six wheel construction is the salvation of motor passenger transportation; that four wheel construction must give way before the increasing demands of modern transportation; that if you buy a SAFEWAY Six Wheel Coach now, it will be operating profitably long after your four wheel buses have been scrapped.

Before you buy another bus, learn all you can about six wheel construction and SAFEWAY Coaches. See them in actual operation. Compare them with four wheel buses. Then place your next order.

Send for SAFEWAY Catalog and folder S 1

**SIX-WHEELER**

**1800 W. LEHIGH AVENUE, PHILADELPHIA, PA.**



# What Comes After The First Cost?

ULTIMATE wheel cost must properly include the cost of the wheel plus all maintenance charges developed during its life.

A lower priced wheel carrying a maintenance obligation may in the last analysis cost more than a higher priced wheel which avoids contour conditioning.

With Davis "One-Wear" Steel Wheels, the first cost is the final cost. Re-turning which ties up men, machinery, capital and cars is unnecessary to develop full wheel life.

This life, many roads find, is longer than that of any wheel made. A special heat-treated, toughened steel is the reason.

Ask for the records.

**American Steel Foundries**
NEW YORK CHICAGO ST. LOUIS

**DAVIS**
"ONE-WEAR"
**STEEL WHEELS**

# Two Books Every Electric Railway Man Should Have

**Examine them for ten days free** — **or** — **Have your name stamped in gold on the covers without charge**




**Blake and Jackson's**

## ELECTRIC RAILWAY TRANSPORTATION

***New Second Edition***

By HENRY W. BLAKE
Editor, Electric Railway Journal and
WALTER JACKSON
Formerly Associate Editor Electric Railway Journal

*Second Edition*

**437 pages, 6x9, 121 illustrations, $5.00 net, postpaid**

A thorough revision of a book covering every important phase of modern electric railway transportation, giving all of the latest developments and all of the latest methods used to meet present-day traffic requirements and competitive activities.

The book gives the most valuable kind of information on getting the cars over the line—handling traffic difficulties—making and maintaining schedules—collecting fares—securing the proper public relations—using the motor bus as a supplementary service—meeting outside bus competition—trackless trolleys—keeping the working force efficient—and hundreds of other important electric railway points.

### CHAPTER HEADINGS

I.—Organization and Definitions. II.—Adjustment of Traffic to Service. III.—Accelerating Traffic Movement Along the Line. IV.—Accelerating Traffic Movement on the Car. V.—Car Types in Relation to Traffic. VI.—City Timetables—Preliminaries. VII.—Interurban Schedules and Dispatching. VIII.—Fares. IX.—Fare Collection Practices and Devices. X.—Public Relations. XI.—Promotion of Passenger Traffic. XII.—Traffic Signs for Cars, Station and Road. XIII.—Motor-Bus Operation by Electric Railways. XIV.—Selection and Training of Men. XV.—Wages and Wage Agreements. XVI.—Employee Relations. XVII.—Discipline of Trainmen. XVIII.—Forms of Extra Pay.

**Richey's**

## ELECTRIC RAILWAY HANDBOOK

***New Second Edition***

By ALBERT S. RICHEY
Consulting Engineer, Professor of Electric Railway Engineering, Worcester Polytechnic Institute.

**798 pages, flexible, pocket size, 600 illustrations, $4.00 net, postpaid**

The 1924 Richey is virtually an encyclopedia on modern electric railway organization, administration and operation. It should be in the reference library of every electric railway in the country. A few new ideas gleaned from one section of this helpful handbook will repay the small price of the book over and over again.

Electric Railway executives, engineers and operating men have long respected Richey's **Electric Railway Handbook** as the one great pocketbook of practice data, formulas and tables in the electric railway field. The new 1924 second edition of Richey covers the latest developments—describes new methods—records changes in theory and practice.

It covers every phase of electric railway work from Roadbed and Track to Signals and Communication. It gives priceless information on problems which come up constantly in everyday electric railway practice. It should be in the hands of non-technical managers as well as operating men and engineers.

### CHAPTER HEADINGS

I.—Roadbed and Track. II.—Car Houses and Shops. III.—Train Movement. IV.—Railway Motors. V.—Controlling Apparatus. VI.—Current Collecting Devices. VII.—Trucks. VIII.—Braking. IX.—Cars. X.—Transmission and Distribution. XI.—Signal and Communication.

***Examine them free—or have your name stamped in gold on covers.***

**Free Holiday Stamping Offer**

Until January 1, 1925, we will stamp your name, or a friend's name in gold on the front covers of these McGraw-Hill books.

Remittances should accompany orders and books stamped are, of course not returnable.

See these new revised electric railway books for yourself. Let us send them to you for ten days' free examination. No obligation to keep them unless you want them—no bother—no agents—no red tape. You simply agree to remit for the books or to return them, postpaid, within ten days.

OR accept our Free Holiday Stamping Offer.

Until January 1, 1925, we will stamp your name, or a friend's name, in gold on the front covers of these books. Remittances should accompany orders for stamped copies. **Stamped books are not returnable.**

***Check A or B on the coupon and mail today***

## SPECIAL HOLIDAY COUPON

**McGraw-Hill Book Co., Inc.**
**370 Seventh Avenue, New York.**

☐ A. Send me the books checked, with name in gold on front cover. I enclose proper remittance and understand that stamped copies are not returnable.

.....
*(Name to be stamped)*

☐ B. Send me the books checked for 10 days' free examination. I agree to remit for the books or to return them, postpaid, within 10 days of receipt.

.....Blake and Jackson—Electric Railway Transportation, $5.00.

.....Richey—Electric Railway Handbook, $4.00.

Name .....

Address .....

Position .....

Company .....

E. 11-29-24



# Collier Service

A nation-wide organization building and sustaining car cardadvertising space values



**Barron G. Collier, Inc.**
Candler Bldg.
**New York**

# "Concrete for Permanence"

# If You Cushion the Shocks



There is no argument against concrete in track construction. The slogan "concrete for permanence" applies here as everywhere else. Only, however, when traffic shocks are not allowed to reach the concrete. For concrete will break under the hammer blows of traffic.

The shock absorbing feature in Dayton Ties protect it by cushioning the shocks.

*Let us tell you other advantages and economies*

THE DAYTON MECHANICAL TIE CO.
707 Commercial Building, DAYTON, OHIO

# DAYTON Resilient TIE



# SILENT!

Silent, smooth meshing gears minimize wear, tear, rattle, vibration and the resultant maintenance expenses.

## NUTTALL HELICAL GEARS

Almost unbelievably quiet and smooth, Nuttall Helical gears are peculiarly suited to electric railway service.

Being scientifically correct in design, forged and heat-treated, Nuttall Gears are exceptionally enduring. They are guaranteed to last at least four times as long as ordinary gears and remain quiet and smooth in operation.

Nuttall gears will lengthen the life of equipment and cut gear costs in the bargain. Our free gear book tells you why.

R.D. NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.



# Success must be earned

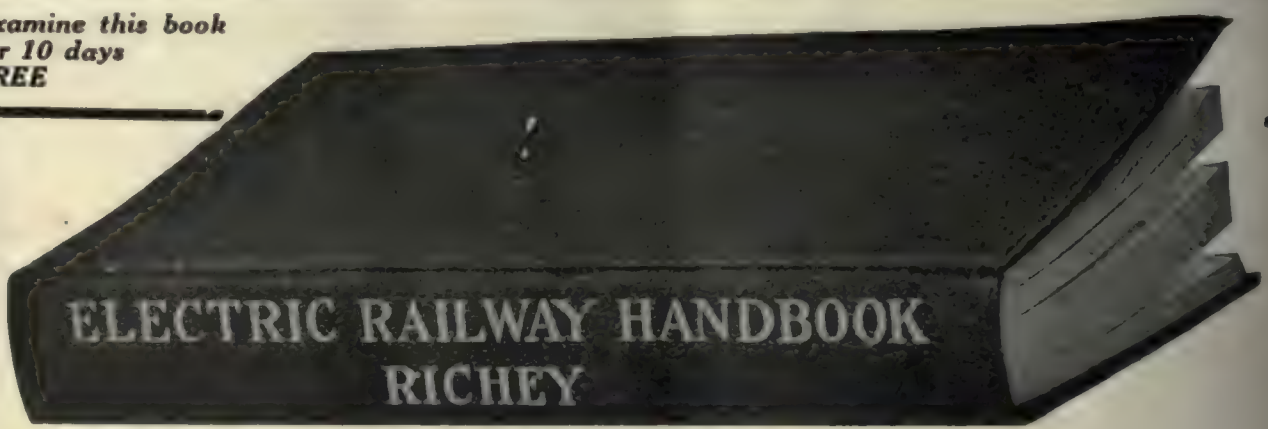
The St. Louis Car Company has earned suc cess. This is best proved by the number o repeat orders—the result of service to th industry and to the public in increasing th capacity, beauty, safety and easy ridin qualities of their cars.

We make them in every type—city, in terurban and safeties, motor and trolle buses.

*Send for photos and data on type interested in*

**St. Louis Car Company**
St. Louis, Mo.
*"The Birthplace of the Safety Car"*

***Examine this book for 10 days FREE***




***Richey's***
**Electric Railway Handbook**

*798 pages, flexible. 4 x 7, over 600 illustrations, $4.00 net, postpaid.*

A pocket encyclopædia of practical information on electric railway work. This book contains the data, formulae and tables that are constantly required by the operating, constructing or designing engineer. It is a book which may be used by the non-technical manager as well as the engineer.

***The first step to bigger pay—***

I. Roadbed and Track.
II. Train Movements.
III. Train Movements.
IV. Railway Motors.
V. Controlling Apparatus.
VI. Current Collecting Devices.
VII. Trucks.
VIII. Braking.
IX. Rolling Stock.
X. Transmission and Distribution.
XI. Signals and Communication.

**Free Examination Coupon**

McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York, N. Y.

You may send me on 10 days' approval Electric Railway Handbook, $4.00 net. I agree to pay for the book or return it postpaid within 10 days of receipt.

Regular subscriber to the Electric Railway Journal?.....
Member of A. I. E. E. or A. E. R. A.?.....
Signed .....
Address .....
Official position.....
Name of company.....

(Books sent on approval to retail purchasers in the U. S and Canada only.) F E



# Quick Accurate Permanent

***A Record of Each Sale When the Sale is Made***

The sale of electric railway transportation is strictly a retail business proposition and should comply with those methods which have been found most successful in other lines of merchandising.

The only safe method is to mechanically indicate and record the amount of each sale in the presence of the purchaser at the time the sale is made.

Ohmer Fare Registers indicate and record the exact amount and class of fare paid at the time it is paid. They apply to electric railroading the correct methods which have brought success to countless retail merchants.

**OHMER FARE REGISTER COMPANY**
**Dayton, Ohio, U. S. A.**

# Your Passengers Will Enjoy Their Ride On

# Hale-Kilburn Seats

Especially Designed for
One Man Safety Cars



*Lightest Weight Stationary Steel Seat*

**Lightest**
**Strongest**
**Simplest**
**Neatest**



*Lightest Weight Walkover Steel Seat*

*No higher in price than others*
*Write for particulars*

## Hale-Kilburn Company
**PHILADELPHIA**

| New York | Chicago | Richmond | Atlanta | San Francisco | Los Angeles |
|---|---|---|---|---|---|
| 30 Church St. | McCormick Bldg. | Mutual Bldg. | Candler Bldg. | 903 Monadnock Bldg. | 320 S. Pedro St. |

AMELECTRIC PRODUCTS

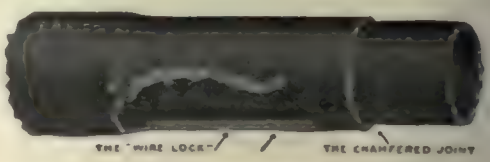
BARE COPPER WIRE AND CABLE
TROLLEY WIRE
WEATHERPROOF WIRE AND CABLE
PAPER INSULATED UNDERGROUND CABLE
MAGNET WIRE

Reg. U. S. Pat. Office
Incandescent Lamp Cord

AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.

Boston, 176 Federal; Chicago, 112 W. Adams; Cincinnati, Traction Bldg.; New York, 100 E. 42nd St.

ELRECO TUBULAR POLES




COMBINE

Lowest Cost
Least Maintenance
Lightest Weight
Greatest Adaptability

Catalog complete with engineering data sent on request.

ELECTRIC RAILWAY EQUIPMENT CO.
CINCINNATI, OHIO
New York City, 30 Church Street

J-P Products of interest to Electric Railways


NOARK Fuses


NOARK Fuse Clips CUTOUT BASES


NOARK Service and Underground Boxes


Railway and Mine hangers and insulators


J-P Molding Service (Contract Basis)


VULCABESTON Sheet and Rope Packing

JOHNS-PRATT CO. HARTFORD, CONN.

ANACONDA
TROLLEY WIRE
ANACONDA COPPER MINING COMPANY
THE AMERICAN BRASS COMPANY
General Offices, Waterbury, Conn.

PEIRCE
Railway Feeder Pins



A strong Forged Steel Pin designed for heavy duty. Their low cost permits their use over the entire system.

HUBBARD & COMPANY
PITTSBURGH CHICAGO



TRADE ANDERSON MARK

For dependable Line Material that will give you maximum service use

Send for Latest Quotations
Main Office and Factory, Boston, Mass.

ROEBLING

WELDING CABLE
ELECTRICAL WIRES and CABLES
John A. Roebling's Sons Company, Trenton, N. J.

Chapman
Automatic Signals
Charles N. Wood Co., Boston



Shaw Lightning Arresters

Standard in the Electric Industries for 35 years

Henry M. Shaw
150 Coit St., Irvington, Newark, N. J.

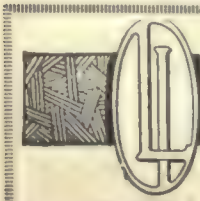


Standard Underground Cable Co.
Manufacturers of
Electric Wires and Cables of all kinds;
also Cable Terminals, Junction Boxes, etc.
Boston Philadelphia Pittsburgh Detroit New York
San Francisco Chicago Washington St. Louis

AUTOMATIC SIGNALS
Highway Crossing Bells
Headway Recorders
Flasher Relays

NACHOD SIGNAL COMPANY, INC.
LOUISVILLE, KENTUCKY.





Trade Mark

*Only reliable products can be continuously advertised*

# American Rail Bonds

CROWN
UNITED STATES
TWIN TERMINAL
SOLDER
TRIPLEX

**Arc Weld and Flame Weld**

*Send for new Rail Bond Book*

**American Steel & Wire Company**
CHICAGO
NEW YORK

# ACME WIRE
PRODUCTS

For over sixteen years this company has produced magnet wire of the highest electrical excellence.

ACME MAGNET WIRE
"Enamelite"—Plain enameled copper wire
"Cottonite"—Cotton-covered "Enamelite"
"Silkenite"—Silk-covered "Enamelite"
Magnet Wire—Cotton or silk, single or double

ACME COIL WINDINGS
Field Coils, Meter Coils, Ignition Coils, Windings for Audio and Radio Frequency Transformers.

ACME VARNISHED INSULATIONS
Varnished Cambrics—
Black and yellow
Varnished Silks and Tapes—
For every requirement
Varnished Papers—
Black and yellow
Varnished Tubing—
"Spaghetti", all sizes, 5 colors
"Celatsite" Wire—
Tinned, spaghetti-covered wire for radio sets; 5 colors
Insulating Varnishes

*Catalog sent Engineers and Executives*

THE ACME WIRE COMPANY
Main Office and Plant, New Haven, Conn.
New York 52 Vanderbilt Ave. Cleveland Guardian Building Chicago 53 W. Jackson Blvd.

# "CARNEGIE"
for
WHEELS
AXLES
RAILS
CROSS TIES



Carnegie Steel Company
PITTSBURGH, PENNA.

# BARBOUR-STOCKWELL CO.
205 Broadway, Cambridgeport, Mass.
Established 1858

Manufacturers of

**Special Work for Street Railways**

Frogs, Crossings, Switches and Mates
Turnouts and Cross Connections
Kerwin Portable Crossovers
Balkwill Articulated Cast Manganese Crossings

ESTIMATES PROMPTLY FURNISHED

# Lorain Special Trackwork Girder Rails

*Electrically Welded Joints*

THE LORAIN STEEL COMPANY
Johnstown, Pa.

*Sales Offices:*
Atlanta Chicago Philadelphia Cleveland Pittsburgh New York

*Pacific Coast Representative:*
United States Steel Products Company
Los Angeles Portland San Francisco Seattle

*Export Representative:*
United States Steel Products Company, New York, N. Y.



*Cambria Rolled Steel Electric Car Wheels*

*Best for Longer Service*

Other products for the electrical field includes axles, armature shafts, rails, spikes, track work, splice bars, bolts, tie plates, tie rods, pole line material, sheets, magnet steel and gear blanks.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

# BETHLEHEM

# THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

**Builders since 1868 of Water Tube Boilers of continuing reliability**

BRANCH OFFICES

BOSTON, 49 Federal Street
PHILADELPHIA, Packard Building
PITTSBURGH, Farmers Deposit Bank Building
CLEVELAND, Guardian Building
CHICAGO, Marquette Building
CINCINNATI, Traction Building
ATLANTA, Candler Building
PHOENIX, ARIZ., Heard Building
DALLAS, TEX., 2001 Magnolia Building
HONOLULU, H. T., Castle & Cooke Building
PORTLAND, ORE., 805 Gasco Building

WORKS

Bayonne, N. J.
Barberton, Ohio

**Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893**

BRANCH OFFICES

DETROIT, Ford Building
NEW ORLEANS, 521-5 Baronne Street
HOUSTON, TEXAS, Southern Pacific Building
DENVER, 435 Seventeenth Street
SALT LAKE CITY, 405-6 Kearns Building
SAN FRANCISCO, Sheldon Building
LOS ANGELES, 404-6 Central Building
SEATTLE, L. C. Smith Building
HAVANA, CUBA, Calle de Aguiar 104
SAN JUAN, PORTO RICO, Royal Bank Building

B. A. HEGEMAN, Jr., President — C. C. CASTLE, First Vice-President
H. A. HEGEMAN, Vice-Pres. and Treas. — F. T. SARGENT, Secretary
W. C. PETERS, Manager Sales and Engineering

## National Railway Appliance Co.

Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., New York
Munsey Bldg., Washington, D. C. — 100 Boylston St., Boston, Mass
Hegeman-Castle Corporation, Railway Exchange Building, Chicago

RAILWAY SUPPLIES

Tool Steel Gears and Pinions
Bell Locked Fare Box and Change Maker
The Aluminum Field Coils
Walter Tractor Snow Plows
Cutler-Hammer Electric Heaters
Pittsburgh Forge & Iron Co.'s Products
Genesco Paint Oils
H. S. Car Control Corporation's Safety Devices
Garland Ventilators
Flaxlinum Insulation
Yellow Coach Mfg. Co.'s Single and Double Deck Busses
Economy Electric Devices Co.'s Power Saving and Inspection Meters
Anglo-American Varnish Co., Varnishes Enamels, etc.
Gilmer Multiple Safety Step Treads
National Hand Holds
Ft. Pitt Spring & Mfg. Co., Springs
Turnstile Car Corporation's Turnstiles
Anderson Slack Adjusters
Feasible Drop Brake Staffs
Dunham Hopper Door Device

## We are prepared

to handle any high grade proposition where

VARNISHED CAMBRIC
Wires and Cables

are required.

When using *quality* Wires and Cables use *quality* Tapes.

"MANSON" Tape, "OKONITE" Tape, "DUNDEE" Tapes.

THE OKONITE CO., Passaic, N. J.

Incorporated 1884

OKONITE TRADE MARK

*Sales Offices: New York—Atlanta—Pittsburgh—San Francisco.*
*Agents:* Central Electric Co., Chicago, Ill.; Pettingell-Andrews Co., Boston, Mass.; The F. D. Lawrence Electric Co., Cincinnati, Ohio; Novelty Electric Co., Philadelphia, Pa.
*Canadian Representatives.* Engineering Materials Limited, Montreal.

# ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.

**Electrical Machinery, Steam Turbines, Steam Engines, Condensers, Gas and Oil Engines, Air Compressors, Air Brakes**

## OXYGEN, ACETYLENE, HYDROGEN

*for cutting, welding, etc.*

Quick shipment and low prices also on cylinders, valves, torches, regulators and supplies.

INTERNATIONAL OXYGEN COMPANY

Main Offices: Newark, N. J.

Branch Offices: New York — Pittsburgh — Toledo

## ALUMINO-THERMIC JOINTS

New and independent process. No inserts needed. Up-to-date and economical.

**Alumino-Thermic Corp., Roselle Park, N. J.**

## RAMAPO AJAX CORPORATION

Ramapo Automatic Return Switch Stands for Passing Sidings

RACOR

RACOR Tee Rail Special Work

Manganese Construction

GENERAL OFFICES: HILBURN, NEW YORK

Chicago — New York — Superior, Wis. — Niagara Falls, N. Y.

Canadian Ramapo Iron Works, Ltd., Niagara Falls, Ont.

## A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

**Cameron Electrical Mfg. Co., Ansonia, Connecticut**

## "Boyerized" Products Reduce Maintenance

Bemis Trucks
Case Hardened Brake Pins
Case Hardened Bushings
Case Hardened Nuts and Bolts
Manganese Brake Heads
Manganese Transom Plates
Manganese Body Bushings
Bronze Axle Bearings

Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.

**Bemis Car Truck Co., Springfield, Mass.**

# NEW and RELAYING RAILS

1 TON OR 1000

TRACK EQUIPMENT

L. B. FOSTER CO.

PITTSBURGH - PENNSYLVANIA

RAIL ACCESSORIES

NEW YORK · JERSEY CITY · PHILADELPHIA · HAMILTON, O.

# RAILWAY UTILITY COMPANY

CAR COMFORT WITH UTILITY

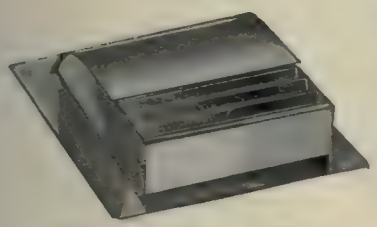
HEATERS
REGULATORS
VENTILATORS

141-151 West 22d St. Chicago, Ill.

*Write for Catalogue*

1328 Broadway New York, N. Y.

## N-L Ventilators are Absolutely WEATHER PROOF



N-L Type "C" Arch Roof Ventilator

Rain! Snow! Cold, searching winds! Don't make your cars stuffy and uncomfortable this winter in order to keep them warm. *Assure yourself* that your passengers will be comfortable. N-L Ventilators will furnish adequate ventilation and are absolutely weather proof under all conditions. Many different designs for street car and bus use.

*Write for our booklet, "Superior Ventilation" for complete detail and information.*

N-L

**The Nichols-Lintern Co.**
7960 Lorain Ave., Cleveland, Ohio

Canadian Representative: Railway & Power Eng. Corp., Ltd., Toronto, Ontario

THE WORLD'S STANDARD
## "IRVINGTON"

Black and Yellow
Varnished Silk, Varnished Cambric, Varnished Paper

Irr-O-Slot Insulation Flexible Varnished Tubing
Insulating Varnishes and Compounds

**Irvington Varnish & Insulator Co.**
Irvington, N. J.
*Sales Representatives in the Principal Cities*

TULC A LUBRICANT

We make a specialty of
## ELECTRIC RAILWAY LUBRICATION
We solicit a test of TULC on your equipment

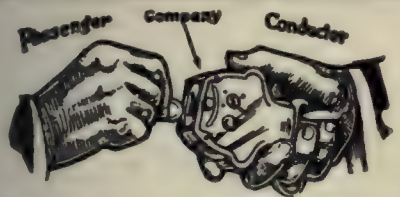
**The Universal Lubricating Co.**
Cleveland, Ohio
Tulc, Inc., Eastern Representative,
1617 Gotham National Bank Bldg., New York City

STOP

## "OSKELITE"
The Stop Light for street cars. Operates from brake system. Details on request.

**The Oskel Equipment Co.**
940 McCormick Bldg., Chicago, Ill.

## PANELYTE
HEADLININGS
THE PANELYTE COMPANY, Trenton, N. J.




**Direct Automatic Registration By the Passengers**
Rooke Automatic Register Co.
Providence, R. I.

PS HEATERS

**Car Heating and Ventilation**
are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

**The Peter Smith Heater Company**
6209 Hamilton Ave., Detroit, Mich.



*Gets Every Fare*
## PEREY TURNSTILES or PASSIMETERS
Use them in your Prepayment Areas and Street Cars

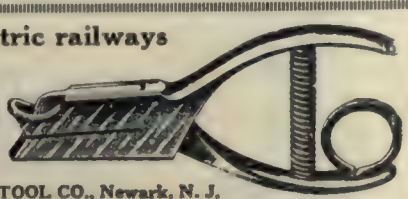
Perey Manufacturing Co., Inc.
101 Park Avenue, New York City

## Heywood-Wakefield
CAR SEATS
of pressed Steel for all Classes of Passenger Service. Rattan for covering seats and for snow sweepers.

HEYWOOD-WAKEFIELD CO.
Factory at Wakefield, Mass.
Offices at New York, Chicago, San Francisco

For detailed description — see — CAR BUILDERS CYCLOPEDIA 1922 Edition

75% of the electric railways use
## B-V Punches
*Send for Catalog*



BONNEY-VEHSLAGE TOOL CO., Newark, N. J.

THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



## No. 478E

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.




Type R-11
Double Register

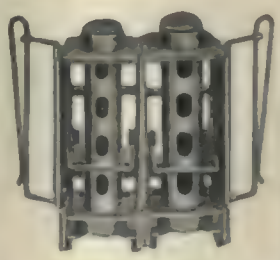
## International Registers

Made in single and double types to meet requirements of service. For hand or foot, mechanical or electric operation. Counters, car fittings, conductors' punches.

Exclusive selling agents for HEEREN ENAMEL BADGES.

**The International Register Co.**
15 South Throop Street, Chicago, Illinois

# JOHNSON Universal Changer



### Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

### Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

**JOHNSON FARE BOX COMPANY**
Ravenswood, Chicago, Ill.

## Play for safety—

*plus resiliency—*
*plus long life*

*By specifying*

**FORT PITT SPRINGS**

FORT PITT SPRING & MFG. CO.
Pittsburgh, Pa.

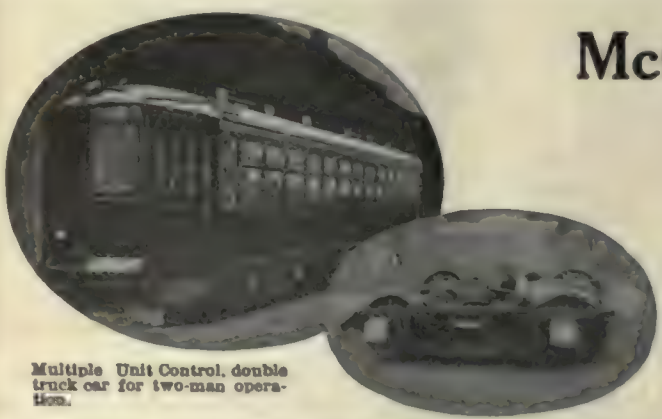


Let Us Tell You of Our Especially Designed Fare Box for the

**ONE MAN CAR**

**THE CLEVELAND FARE BOX COMPANY**
Cleveland, Ohio
Canadian Cleveland Fare Box Co., Ltd., Preston, Ontario

100 New Users in the Last Nine Months
**KASS SAFETY TREADS**
HIGH
in efficiency and lasting qualities
LOW
in weight, initial and upkeep costs
Morton Manufacturing Co., Chicago



Multiple Unit Control, double truck car for two-man operation.

# McGUIRE-CUMMINGS

*Manufacturing Company*

General Offices
111 W. Monroe St., Chicago, Ill.

## Street Cars, Trucks Snow Sweepers

SAMSON SPOT WATERPROOFED TROLLEY CORD



Trade Mark Reg. U. S. Pat. Off.
Made of extra quality stock firmly braided and smoothly finished. Carefully inspected and guaranteed free from flaws. Samples and information gladly sent.
SAMSON CORDAGE WORKS, BOSTON, MASS.

**PROVIDENCE FENDERS** **H-B LIFE GUARDS**

The Consolidated Car Fender Co., Providence, R. I.
Wendell & MacDuffie Co., 110 E. 42nd St., New York
General Sales Agents

Advertisements for the
## Searchlight Section



Can be received at the New York Office of Electric Railway Journal until 10 a. m.

## Wednesday

For issue out Saturday

0220

# SEARCHLIGHT SECTION

## USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD:

*Positions Wanted*, 4 cents a word, minimum 75 cents an insertion, payable in advance.

*Positions Vacant* and all other classifications, 8 cents a word, minimum charge $2.00.

*Proposals*, 40 cents a line an insertion.

INFORMATION:

*Box Numbers* in care of any of our offices count 10 words additional in undisplayed ads.

*Discount* of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 to 3 inches.....$4.50 an inch
4 to 7 inches..... 4.30 an inch
8 to 14 inches..... 4.10 an inch

Rates for larger spaces, or yearly rates, on request.

*An advertising inch* is measured vertically on one column, 3 columns—30 inches—to a page.

E.F.J.

### POSITION VACANT

DESIGNERS and draftsmen with electric railway power experience wanted for work in the East. Applicants will please state age, experience in detail, salary expected and when they will be available for employment. P-754, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

SHOP foreman wanted for electric railway in New England. Give experience, reference, age and salary expected in first letter. P-752, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

### POSITIONS WANTED

AUDITOR or assistant. Twenty years' experience in electric light, power and railways. At present employed but desire to make change. PW-750, Elec. Ry. Journal, Leader-News Bldg., Cleveland, Ohio.

AUDITOR, broad and thorough experience in financing and accounting; all branches railway, electric and gas utilities, open for engagement. Possess initiative and capable of assuming full control of all accounting matters. PW-758, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

EXECUTIVE. Urban and interurban. Wide successful experience in all departments of construction and operation. PW-740, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

MASTER mechanic desires change; 18 years' experience on city and high speed interurban. Best of references furnished. PW-756, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT—City or interurban; twelve years' successful experience in maintenance, operation and public relations. PW-757, Electric Railway Journal, 10th Ave. at 36th St., New York.


**WANTED MANAGER**

To take charge and operate Railway Department, 125 miles of city and interurban track. 300 street cars. Reply, giving full particulars, to

**Winnipeg Electric Co.**
Winnipeg, Canada
A. W. McLimont, Vice President

WE WANT TO BUY
30—West. 306-C.V.-4
**MOTORS**
Have you any to offer?
ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

WANTED
**LATHE**
in good condition with at least 8 ft. between centers and 36-in. swing, suitable for turning wheels; motor driven preferred.
ATLANTIC CITY & SHORE R.R. CO.
Atlantic City, N. J.

**Rails!**

**In Small Lots As Well As Large**

THERE is a class of rail buyers, occasionally in need of only small tonnages, who are paying a premium on their purchases elsewhere because they believe that we do not seek their patronage.

We maintain a large organization to give efficient service on small orders. Our tremendous volume gives us unequaled buying power and saves our clients money regardless of the tonnage required.

Immense stocks at strategic distributing points provide complete assortments near you. This adds a saving in freight to our already unbeatable prices.

Next time you need rails, let us know your requirements.

*We guarantee the same prompt, efficient service to all.*

**HYMAN-MICHAELS COMPANY**
*"The House of Dependable Service"*
**122 South Michigan Avenue, Chicago**

Dealers in New and Relaying Rails,
Locomotives and Railway Equipment

*District Offices:* New York, Woolworth Bldg.; St. Louis, Railway Exchange Bldg.; Pittsburgh, First Nat'l Bank Bldg.; San Francisco, 234 Steuart St.
*Yards:* St. Louis, East Chicago, Ind., McKee's Rocks, Pa., San Francisco.
*Cable Address:* "Hymanmikel"
*World's Largest Distributors of Rails*

FOR SALE
**Three Trolley Cars**
Double end operation—42 feet overall—seating capacity 44.
MONSANTO CHEMICAL WORKS
St. Louis, Missouri

FOR SALE
**MOTORS**
22—G.E. 210; practically new.
TRANSIT EQUIPMENT COMPANY
501 Fifth Ave., New York

**RAILS**
New Relaying
1 TON = 1000
FROGS
SWITCHES
SPLICE BARS
BOLTS
NUTS
TIE PLATES
RAIL
BRACES
All Rails and Track Materials shipped subject to inspection and approval at destination.
**L.B. Foster Co.**
PITTSBURGH-PA
NEW YORK
©L.B.F.C.

**NEW GEARS, PINIONS AND GEAR CASES FOR SALE**
GE-1000 Motor:
173 15 tooth pinions
107 69 tooth gears
16 Sheet iron gear cases
GE-800 Motor:
4 malleable gear cases and 3 bottom halves
FS-749, Electric Railway Journal
10th Ave. at 36th St., New York City

**SPARE MOTOR BARGAIN**
Suitable for spares on grinders, pumps, compressors, etc., D.C., 550 v., 1700 r.p.m., with pulleys, rails and starters. 1—10-hp. at $84, and 2—7½-hp. at $72 each. Condition O.K. Overhauled.
STANDARD ELECTRIC MACHY. CO.
9 E. Hill St., Baltimore

# WHAT AND WHERE TO BUY

**Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue**

**Advertising, Street Car**
Collier, Inc., Barron G.

**Anchors, Guy**
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

**Armature Shop Tools**
Elec. Service Supplies Co.

**Automatic Return Switch Stands**
Ramapo Ajax Corp.

**Automatic Safety Switch Stands**
Ramapo Ajax Corp.

**Axles**
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Johnson & Co., J. R.
Laclede Steel Co.
St. Louis Car Co.
Westinghouse E. & M. Co.

**Axles (Front & Rear) Motor Bus and Passenger Car**
Timken-Detroit Axle Co.

**Axles, Trailer & Motor Bus**
Timken-Detroit Axle Co.

**Badges and Buttons**
Elec. Service Supplies Co.
International Register Co., The

**Bearings and Bearing Metals**
Bemis Car Truck Co.
Brill Co., J. G., The
General Electric Co.
More-Jones Brass & Metal Co.
St. Louis Car Co.
Westinghouse E. & M. Co.

**Bearings, Center and Roller Side**
Stucki Co., A.

**Bells and Gongs**
Brill Co., The J. G.
Consolidated Car Heat. Co.
Elec. Service Supplies Co.
St. Louis Car Co.

**Bearings, Roller**
Norma-Hoffman Bearings Corp.

**Boilers**
Babcock & Wilcox Co.

**Bonding Apparatus**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Track-work Co.

**Bonds, Rail**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse E. & M. Co.

**Book Publishers**
McGraw-Hill Book Co.

**Boxes, Switch**
Johns-Pratt Co.

**Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)**
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

**Brake Adjusters**
Brill Co., The J. G.
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.

**Brake Shoes**
Amer. Br. Shoe & Fdy. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.

**Brakes, Brake Systems and Brake Parts**
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
General Electric Co.
National Brake Co.
St. Louis Car Co.
Safety Car Devices Co.
Westinghouse Tr. Br. Co.

**Brushes, Carbon**
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Westinghouse E. & M. Co.

**Buses, Motor**
Brill Co., The J. G.
International Motor Co.
St. Louis Car Co.
Six Wheel Co.

**Bushings, Case Hardened and Manganese**
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.

**Cables. (See Wires and Cables)**

**Cambric Tapes, Yellow and Black Varnish**
Acme Wire Co.
Irvington Varnish & Ins. Co.

**Carbon Brushes (See Brushes, Carbon)**

**Cars, Dump**
Brill Co., J. G., The
Differential Steel Car Co.
St. Louis Car Co.

**Car Lighting Fixtures**
Elec. Service Supplies Co.

**Car Panel Safety Switches**
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.

**Cars, Passenger, Freight, Express, etc.**
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

**Cars, Gas, Rail**
Brill Co., J. G., The
St. Louis Car Co.

**Cars, Second Hand**
Electric Equipment Co.
Transit Equipment Co.

**Cars, Self-Propelled**
Brill Co., J. G., The
General Electric Co.

**Car Wheels, Rolled Steel**
Bethlehem Steel Co.

**Castings, Brass, Composition or Copper**
Anderson Mfg. Co., A. & J. M.
More-Jones Brass & Metal Co.

**Castings, Gray Iron and Steel**
Bemis Car Truck Co.
Fort Pitt Steel Castings Co.
St. Louis Car Co.

**Castings, Malleable and Brass**
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Fort Pitt Steel Castings Co.
St. Louis Car Co.

**Catchers and Retrievers, Trolley**
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

**Catenary Construction**
Archbold-Brady Co.

**Ceilings, Plywood, Panels**
Haskelite Mfg. Co.

**Chains, Parlor Car**
Heywood-Wakefield Co.

**Change Carriers**
Cleveland Fare Box Co.

**Circuit-Breakers**
Anderson, A. & J. M. Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Clamps and Connectors for Wires and Cables**
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

**Cleaners and Scrapers Track (See also Snow-Plows, Sweepers and Brooms)**
Brill Co., The J. G.
St. Louis Car Co.

**Clusters and Sockets**
General Electric Co.

**Coal and Ash Handling (See Conveying and Hoisting Machinery)**

**Coil Banding and Winding Machines**
Elec. Service Supplies Co.

**Coils Armature and Field**
General Electric Co.
Westinghouse E. & M. Co.

**Coils, Choke and Kicking**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

**Coin Counting Machines**
Cleveland Fare Box Co.
Intern'l Register Co.
Johnson Fare Box Co.

**Coin Sorting Machines**
Cleveland Fare Box Co.

**Coin Wrappers**
Cleveland Fare Box Co.

**Commutator Slotters**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co

**Commutator Truing Devices**
General Electric Co.

**Commutators or Parts**
Cameron Elec'l Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Compressors, Air**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Tr. Br. Co.

**Concrete Reinforcing Bars**
Laclede Steel Co.

**Condenser Papers**
Irvington Varnish & Ins. Co

**Condensers**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Connectors, Solderless**
Frankel Connector Co.
Westinghouse E. & M. Co.

**Connectors, Trailer Car**
Consolidated Car Heat. Co.
Elec. Service Supplies Co.
Ohio Brass Co.

**Controllers or Parts**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Controller Regulators**
Elec. Service Supplies Co.

**Controlling Systems**
General Electric Co.
Westinghouse E. & M. Co.

**Converters, Rotary**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Copper Wire**
Anaconda Copper Mining Co.

**Cord, Bell, Trolley, Register**
Brill Co., The J. G.
Elec. Service Supplies Co.
Internat'l Register Co., The
Roebling's Sons Co., John A.
St. Louis Car Co.
Samson Cordage Works

**Cord Connectors and Couplers**
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

**Couplers Car**
Brill Co., The J. G.
Ohio Brass Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.

**Cross Arms (See Brackets)**

**Crossing Foundations**
International Steel Tie Co

**Crossing, Frog & Switch**
Ramapo Ajax Corp.

**Crossing, Manganese**
Bethlehem Steel Co.
Ramapo Ajax Corp.

**Crossings**
Ramapo Ajax Corp.

**Crossings, Track (See Track, Special Work)**

**Crossings, Trolley**
Ohio Brass Co.

**Curtains & Curtain Fixtures**
Brill Co., The J. G.
Elec. Service Supplies Co.
Morton Mfg. Co.
St. Louis Car Co.

**Dealer's Machinery**
Elec. Equipment Co.
Hyman-Michaels Co.
Transit Equipment Co.

**Derailing Devices (See also Track Work)**

**Derailing Switches**
Ramapo Ajax Corp.

**Destination Signs**
Elec. Service Supplies Co.

**Detective Service**
Wish-Service, P. Edward

**Door Operating Devices**
Brill Co., The J. G.
Consolidated Car Heat. Co
General Electric Co.
Nat'l Pneumatic Co., Inc.
St. Louis Car Co.
Safety Car Devices Co.

**Doors & Door Fixtures**
Brill Co., The J. G.
Consolidated Car Heat. Co
General Electric Co.
Morton Mfg. Co.

**Doors, Folding Vestibule**
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.

**Drills, Track**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.

**Dryers, Sand**
Elec. Service Supplies Co

**Ears**
Ohio Brass Co.

**Electrical Wires and Cables**
Amer. Electrical Works
Amer. Steel & Wire Co.
Roebling's Sons & Co., J. A.

**Electric Grinders**
Railway Track-work Co.
Western Electric Co.

**Electrodes, Carbon**
Railway Track-work Co.

**Electrodes, Steel**
Railway Track-work Co.

**Engineers, Consulting, Contracting and Operating**
Allison & Co., J. S.
Archbold-Brady Co.
Beeler, John A.
Buchanan & Layng Corp.
Bureau of Commercial Economics, Inc.
Byllesby & Co., H. M.
Day & Zimmerman, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Ong, Joe R.
Railway Audit & Inspection Co.
Richey, Albert S.
Robinson & Co., Dwight P.
Sanderson & Porter
Stevens & Wood
Stone & Webster
White Eng. Corp., The J. G.

**Engineering**
Equipment Engineering Co.

**Engines, Gas, Oil or Steam**
Allis-Chalmers Mfg. Co.
Westinghouse E. & M. Co.

**Fare Boxes**
Cleveland Fare Box Co.
Johnson Fare Box Co.
Nat'l Ry Appliance Co.
Ohmer Fare Register Co.

**Fare Registers**
Ohmer Fare Register Co.

**Fences, Woven Wire and Fence Posts**
Acme Wire Co.
Amer. Steel & Wire Co.

**Fenders and Wheel Guards**
Brill Co., The J. G.
Consolidated Car Fender Co.
Elec. Service Supplies Co.
St. Louis Car Co.

**Fibre and Fibre Tubing**
Westinghouse E. & M. Co

**Field Coils (See Coils)**
**Floodlights**
Elec. Service Supplies Co.

**Forgings**
Brill Co., J. G., The

**Frogs & Crossings, Tee Rail**
Bethlehem Steel Co.
Ramapo Ajax Corp.

**Frogs, Track (See Track Work)**

**Frogs, Trolley**
Ohio Brass Co.

**Fuses and Fuse Boxes**
Consolidated Car Heat. Co
General Electric Co.
Westinghouse E. & M. Co

**Fuses, Cartridge, Non-Refillable & High Voltage**
Johns-Pratt Co.

**Fuses, Refillable**
General Electric Co.
Johns-Manville, Inc.
Johns-Pratt Co.

**Gaskets**
Westinghouse Tr. Br. Co.

**Gas Producers**
Westinghouse E. & M. Co.

**Gas-Electric Cars**
General Elec. Co.
Westinghouse E. & M. Co

**Gates, Car**
Brill Co., The J. G.
St. Louis Car Co.

**Gear Blanks**
Bethlehem Steel Co.
Brill Co., J. G., The

**Gear Cases**
Chillingworth Mfg. Co.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

**Gears and Pinions**
Bemis Car Truck Co.
Bethlehem Steel Co.
Elec. Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

**Generating Sets, Gas-Electric**
General Electric Co.

**Generators**
Allis-Chalmers Mfg. Co
General Electric Co.
Westinghouse E. & M. Co.

**Girder Rails**
Bethlehem Steel Co.
Lorain Steel Co.

**Gong (See Bells and Gongs)**

**Greases (See Lubricants)**

**Grinders and Grind Supplies**
Indianapolis Switch & Frog Co.
Railway Track-work Co.

**Grinders, Portable**
Railway Track-work Co.

**Grinders, Portable Electric**
Railway Track-work Co.

**Grinding Bricks and Wheels**
Railway Track-work Co.

**Guard Rail Clamps**
Ramapo Ajax Corp.

**Guard Rails, Tee Rail & Manganese**
Ramapo Ajax Corp.

**Guards, Trolley**
Elec. Service Supplies Co.
Ohio Brass Co.

**Harps, Trolley**
Elec. Service Supplies Co.
More-Jones Brass Metal Co.
Nuttall Co., R. D.
Star Brass Works
Thornton Trolley Wheel Co.

**Headlights**
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.

**Headlining**
Haskelite Mfg. Co.
Panelyte Co.

**Heaters, Car (Electric)**
Consolidated Car Heat. Co.
Gold Car Heat. & Ltg. Co.
Nat'l Ry. Appliance Co.
Smith Heater Co., Peter

**Heaters, Car, Hot Air and Water**
Elec. Service Supplies Co.
Smith Heater Co., Peter

**Helmets—Welding**
Railway Track-work Co.

**Hydraulic Machinery**
Allis-Chalmers Mfg. Co.

**Indicating Signals**
Oskel Equipment Co.

**Instruments Measuring, Testing and Recording**
Elec. Service Supplies Co.
General Electric Co.
Johns-Pratt Co.
Westinghouse E. & M. Co.

*You're having brush trouble*

CORRECT IT

USE LE CARBONE CARBON BRUSHES

*They talk for themselves*

COST MORE PER BRUSH
COST LESS PER CAR MILE

W. J. Jeandron
345 Madison Avenue, New York
Pittsburgh Office: 634 Wabash Bldg.
Chicago Office: 1657 Monadnock Block
San Francisco Office: 525 Market Street
Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal and Toronto





*"Differential Two-Car Train. Trailer dumping load clear of trench."*

DIFFERENTIAL CARS
Standard on Fifty Railways for

Track Maintenance — Track Construction
Ash Disposal — Hauling Crossties
Placing Ballast — Disposal of Waste
Coal Hauling — Snow Disposal
Concrete Materials to the Job
Excavated Material to the Dump

*For Economy*

THE CLARK CONCRETE BREAKER
THE DIFFERENTIAL BOTTOM DUMP CAR
THE DIFFERENTIAL COMBINATION CAR-WHEEL TRUCK and TRACTOR

THE DIFFERENTIAL STEEL CAR CO.
Findlay, Ohio, U. S. A.



The 50,000 Mile Trolley Device



The Thornton is all that and MORE. Some users figure to get 100,000 miles from them. None of these bearings have yet worn out. This long life is due to the design and construction of the bearings and the method of lubrication. No vibration. No noise. Fewer inspections. Less oil. Get the facts!

Thornton Trolley Wheel Co.
Incorporated
Ashland, Kentucky



Griffin Wheel Company
410 North Michigan Ave.
Chicago, Ill.

GRIFFIN
F. C. S.
WHEELS

For Street and Interurban Railways

FOUNDRIES:

Chicago — Boston — St. Paul
Detroit — Kansas City — Los Angeles
Denver — Council Bluffs — Tacoma





MORE-JONES "TIGER" BRONZE AXLE & ARMATURE BEARINGS

Strong-tough-durable
anti-frictional
economical

MORE-JONES BRASS & METAL CO
ST. LOUIS MISSOURI

**Insulating Cloth, Paper and Tape**
General Electric Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Stand. Underground Cable Co.
Westinghouse E. & M. Co.

**Insulating, Silk & Varnish**
Irvington Varnish & Ins. Co.

**Insulation (See also Paints)**
Electric Ry. Equipment Co.
Elec. Service Suplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Westinghouse E. & M. Co.

**Insulation Slots**
Irvington Varnish & Ins. Co.

**Insulators (See also Line Materials)**
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse E. & M. Co.

**Insulator Pins**
Elec. Service Supplies Co.
Hubbard & Co.

**Insulators, High Voltage**
Lapp Insulator Co., Inc.

**Jacks (See also Cranes, Hoists and Lifts)**
Elec. Service Supplies Co.

**Joints, Rail**
(See Rail Joints)

**Journal Boxes**
Bemis Car Truck Co.
Brill Co., J. G.
Fort Pitt Steel Castings Co.
St. Louis Car Co.

**Junction Boxes**
Std. Underground Cable Co.

**Lamps, Guards and Fixtures**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

**Lamps, Arc & Incandescent (See also Headlights)**
General Electric Co.
Westinghouse E. & M. Co.

**Lamps, Signal and Marker**
Nichols-Lintern Co.
Ohio Brass Co.

**Lanterns, Classification**
Nichols-Lintern Co.

**Lightning Protection**
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Shaw, Henry M.
Westinghouse E. & M. Co.

**Line Material (See also Brackets, Insulators, Wires, etc.)**
Archbold-Brady Co.
Electric Ry. Equipment Co.
Elec. Service Sup. Co.
General Electric Co.
Hubbard & Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

**Locomotives, Electric**
General Electric Co.
McGuire-Cummings Mfg. Co
St. Louis Car Co.
Westinghouse E. & M. Co.

**Lubricating Engineers**
Galena Signal Oil Co.
Universal Lubricating Co.

**Lubricants, Oil and Grease**
Galena Signal Co.
Universal Lubricating Co.

**Manganese Parts**
Bemis Car Truck Co.

**Manganese Steel Castings**
Wm. Wharton, Jr. & Co.

**Manganese Steel Guards Rails**
Ramapo Ajax Corp.

**Manganese Steel, Special Track Work**
Bethlehem Steel Co.

**Manganese Steel Switches Frogs & Crossings**
Bethlehem Steel Co.
Ramapo Ajax Corp.

**Meters (See Instruments)**

**Molding, Metal**
Allis-Chalmers Mfg. Co.

**Motor Buses (See Buses, Motor)**

**Motors, Electric**
Allis-Chalmers Mfg. Co.
Westinghouse E. & M. Co.

**Motors and Generators, Sets**
Allis-Chalmers Mfg. Co.
General Electric Co.

**Motormen's Seats**
Brill Co., J. G.
Elec. Service Sup. Co.
Heywood-Wakefield Co.
St. Louis Car Co.
Wood Co., Chas. N.

**Nuts and Bolts**
Barbour-Stockwell Co.
Bemis Car Truck Co.
Bethlehem Steel Co.
Hubbard & Co.

**Oils (See Lubricants),**

**Omnibuses (See Buses, Motor)**

**Oxygen**
International Oxygen Co.

**Oxy-Acetylene (See Cutting Apparatus, Oxy-Acetylene)**

**Packing**
Elec. Service Suplies Co.
Westinghouse E. & M. Co.

**Paints and Varnishes (Insulating)**
Irvington Varnish & Ins. Co.

**Paints and Varnishes for Woodwork**
National Ry. Appliance Co

**Paving Material**
Amer. Br. Shoe & Fdy. Co.

**Pickup, Trolley Wire**
Elec. Service Supplies Co.
Ohio Brass Co.

**Pinion Pullers**
Elec. Service Supplies Co
General Electric Co.
Wood Co., Chas. N.

**Pinions (See Gears)**

**Pins, Case Hardened, Wood and Iron**
Bemis Car Truck Co.
Elec. Service Sup. Co.
Ohio Brass Co.
Westinghouse Tr. Brake Co.

**Pipe Fittings**
Westinghouse Tr. Brake Co.

**Planers (See Machine Tools)**

**Plates for Tee Rail Switches**
Ramapo Ajax Corp.

**Pliers, Rubber Insulated**
Elec. Service Sup. Co.

**Pole Line Hardware**
Bethlehem Steel Co.
Ohio Brass Co.

**Poles, Metal Street**
Elec. Ry. Equipment Co.
Hubbard & Co.

**Pole Reinforcing**
Hubbard & Co.

**Poles & Ties Treated**
Bell Lumber Co.

**Poles, Ties, Posts, Piling & Lumber**
Bell Lumber Co.

**Poles, Trolley**
Bell Lumber Co.
Elec. Service Supplies Co.
Nuttall Co., R. D.

**Poles, Tubular Steel**
Elec. Ry. Equipment Co.
Elec. Service Sup. Co.

**Porcelain Special High Voltage**
Lapp Insulator Co., Inc.

**Potheads**
Okonite Co.

**Power Saving Devices**
National Ry. Appliance Co
Railway Improvement Co.

**Pressure Regulators**
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

**Pumps**
Allis-Chalmers Mfg. Co.

**Punches, Ticket**
Bonney-Vehslage Tool Co.
Intern'l Register Co., The
Wood Co., Chas. N.

**Rail Braces & Fastenings**
Ramapo Ajax Corp

**Rail Grinders (See Grinders)**

**Rail Joints**
Carnegie Steel Co.

**Rail Joints—Welded**
Lorain Steel Co.

**Rails, Relaying**
Fuster Co., L. B.
Hyman-Michaels Co.

**Rails, Steel**
Bethlehem Steel Co.
Carnegie Steel Co.
Foster Co., L. B.

**Railway Paving Guards, Steel**
Godwin Co., Inc., W. S.

**Railway Safety Switches**
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.

**Rail Welding**
Railway Track-work Co.

**Rattan**
Brill Co., The J. G.
Elec. Service Supplies Co.
Heywood-Wakefield Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

**Registers and Fittings**
Brill Co., The J. G.
Elec. Service Supplies Co.
Intern'l Register Co., The
Ohmer Fare Register Co.
Rooke Automatic Register Co.
St. Louis Car Co.

**Reinforcement, Concrete**
Amer. Steel & Wire Co.

**Repair Shop Appliances (See also Coil Banding and Winding Machines)**
Elec. Service Supplies Co.

**Repair Work (See also Cells)**
General Electric Co.
Westinghouse E. & M. Co.

**Replacers, Car**
Elec. Service Sup. Co.

**Resistances**
Consolidated Car Heat. Co.

**Resistance, Wire and Tube**
General Electric Co.
Westinghouse E. & M. Co.

**Retrievers, Trolley (See Catchers and Retrievers, Trolley)**

**Rheostats**
General Electric Co.
Westinghouse E. & M. Co.

**Roofing Car**
Pantasote Co., Inc.

**Roofs**
Haskelite Mfg. Co.

**Sanders, Track**
Brill Co., The J. G.
Elec. Service Sup. Co.
Nichols-Lintern Co.
Ohio Brass Co.
St. Louis Car Co.

**Sash Fixtures, Car**
Brill Co., The J. G.
St. Louis Car Co.

**Scrapers, Track (See Cleaners and Scrapers, Track)**

**Screw Drivers, Rubber Insulated**
Elec. Service Sup. Co.

**Seats, Bus**
Brill Co., J. G., The
Heywood-Wakefield Co.
St. Louis Car Co.

**Seats, Car (See also Rattan)**
Brill Co. The J. G.
Heywood-Wakefield Co.
St. Louis Car Co.

**Seating Materials**
Brill Co., J. G.
Heywood-Wakefield Co.
Pantasote Co., Inc.
St. Louis Car Co.

**Second Hand Equipment**
Electric Equipment Co.
Hyman-Michaels Co.
Transit Equipment Co.

**Shades, Vestibule**
Brill Co., The J. G.

**Shovels**
Brill Co., The J. G.
Hubbard & Co.

**Side Bearings (See Bearings, Center and Side)**

**Signals, Car Starting**
Consolidated Car. Heat Co.
Elec. Service Sup. Co.
Nat'l Pneumatic Co., Inc.

**Signals, Indicating**
Nichols-Lintern Co.
Oakel Equipment Co.

**Signal Systems, Highway Crossing**
Nachod Signal Co., Inc.
Wood Co., Chas. N.

**Signal Systems, Block**
Elec. Service Sup. Co.
Nachod Signal Co., Inc.

**Slack Adjusters (See Brake Adjusters)**

**Sleet Wheels and Cutters**
Anderson Mfg. Co., A. & J. M.
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.

**Smokestacks, Car**
Nichols-Lintern Co.

**Sockets & Receptacles**
National Metal Molding Co

**Snow Sweepers, Rattan**
Heywood-Wakefield Co

**Snow-Plows, Sweepers and Brooms**
Brill Co., The J. G.
Consolidated Car Fender Co
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

**Soldering and Brazing Apparatus (See Welding Processes and Apparatus)**
Irvington Varnish & Ins. Co.

**Solderless, Connector**
Frankel Connector Co.

**Special Adhesive Papers**
Irvington Varnish & Ins. Co.

**Special Trackwork**
Bethlehem Steel Co.
Lorain Steel Co.

**Spikes**
Amer. Steel & Wire Co.

**Splicing Compounds**
Westinghouse E. & M. Co.

**Splicing Sleeves (See Clamps and Connectors)**

**Springs, Car and Truck**
Amer. Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Fort Pitt Spring & Mfg. Co.
St. Louis Car Co.

**Sprinklers, Track and Road**
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

**Steel and Steel Products**
Carnegie Steel Co.

**Steps, Car**
Brill Co., J. G., The
Morton Mfg. Co.

**Stokers, Mechanical**
Babcock & Wilcox Co.
Westinghouse E. & M. Co.

**Stop Signals**
Nichols-Lintern Co.
Oakel Equipment Co.

**Storage Batteries (See Batteries, Storage)**

**Strain, Insulators**
Anderson, A. & J. M. Mfg. Co.
Ohio Brass Co.

**Strand**
Roebling's Sons Co., J. A.

**Straps, Car, Sanitary**
Railway Improvement Co.

**Subway Boxes**
Johns-Pratt Co.

**Superheaters**
Babcock & Wilcox Co.

**Sweepers, Snow (See Snow Plows, Sweepers and Brooms)**

**Switches, Safety**
Johns-Pratt Co.

**Switches, Selector**
Nichols-Lintern Co.

**Switches, Tee Rail**
Ramapo Ajax Corp.

**Switches, Track (See Track Special Work)**

**Switches and Switchboards**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

**Tamper Tie**
Railway Track-work Co.

**Tapes and Cloths (See Insulating Cloth, Paper and Tape)**

**Tee Rail Special Track Work**
Bethlehem Steel Co.
Ramapo Ajax Corp.

**Telephones and Parts**
Elec. Service Supplies Co.

**Terminals, Cable**
Std. Underground Cable Co

**Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)**

**Thermostats**
Consolidated Car Heat. Co.
Gold Car Heat. & Ltg. Co.
Railway Utility Co.
Smith Heater Co., Peter

**Ticket Choppers & Destroyers**
Elec. Service Supplies Co.

**Ties, All-Metal**
Metal Safety R. R. Tie Co.

**Ties, Mechanical**
Dayton Mechanical Tie Co.

**Ties and Tie Rods, Steel**
Barbour-Stockwell Co.
Carnegie Steel Co.
International Steel Tie Co.

**Ties, Wood Cross (See Poles, Ties, Posts, etc.)**

**Tool Steel**
Bethlehem Steel Co.

**Tools, Track & Miscellaneous**
Amer. Steel & Wire Co.
Elec. Service Supplies Co
Hubbard & Co.
Railway Track-work Co.

**Torches, Acetylene (See Cutting Apparatus)**

**Towers and Transmission Structures**
Archbold-Brady Co.
Westinghouse E. & M. Co

**Track Grinders**
Railway Track-work Co.

**Trackless Trolley Cars**
Brill Co., J. G., The
St. Louis Car Co.

**Track, Special Work**
Barbour-Stockwell Co.
Bethlehem Steel Co.
Ramapo Ajax Corp

**Transfer (See Tickets)**

**Transfer Issuing Machines**
Ohmer Fare Register Co.

**Transfer Tables**
American Bridge Co.

**Transformers**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Treads, Safety, Stair, Car Step**
Morton Mfg. Co.

**Trolley Bases**
Elec. Service Supplies Co.
General Electric Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Ohio Brass Co.

**Trolley Bases, Retrieving**
Elec. Service Supplies Co.
Nuttall Co., R. D.
Ohio Brass Co .

**Trolley Buses**
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.

**Trolley Material, Overhead**
Anderson, A. & J. M. Mfg. Co.
Elec. Service Supplies Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.

**Trolley Wheel Bushings**
More-Jones Brass & Metal Co.

**Trolley Wheels & Harps**
More-Jones Brass & Metal Co.
Thornton Trolley Wheel Co

**Trolley Wheels (See Wheels, Trolley)**

**Trolley Wire**
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Roebling's Sons Co., J. A.

**Trucks, Car**
Bemis Car Truck Co.
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
Taylor Elec. Truck Co.

**Tubing, Yellow & Black Flexible Varnish**
Irvington Varnish & Ins. Co.

**Turbines, Steam**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Turbines, Water**
Allis-Chalmers Mfg. Co.

**Turnstiles**
Elec. Service Supplies Co.
Perey Mfg. Co., Inc.

**Valves**
Ohio Brass Co.
Westinghouse Tr. Br. Co

**Varnished Papers & Silks**
Acme Wire Co.
Irvington Varnish & Ins. Co.

**Ventilators, Car**
Brill Co., The J. G.
Nat'l Ry. Appliance Co.
Nichols-Lintern Co.
Railway Utility Co.
St. Louis Car Co.

**Welded Rail Joints**
Alumino-Thermic Corp.
Ohio Brass Co.
Railway Track-work Co.

**Welders, Portable Electric**
Ohio Brass Co.
Railway Track-work Co.

**Welding & Cutting Tools**
International Oxygen Co.

**Welding Processes and Apparatus**
Alumino-Thermic Corp.
General Electric Co.
International Oxygen Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse E. & M. Co.

**Welding Steel**
Railway Track-work Co.

**Wheel Guards (See Fenders and Wheel Guards)**

**Wheel Presses (See Machine Tools)**

**Wheels, Car, Cast Iron**
Bemis Car Truck Co.
Carnegie Steel Co.
Griffin Wheel Co

**Wheels, Wrought Steel**
Carnegie Steel Co.

**Wheels, Trolley**
Elec. Ry Equipment Co
Elec Service Supplies Co.
General Electric Co
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Star Brass Works.

**Whistles, Air**
General Electric Co.
Ohio Brass Co
Westinghouse E. & M. Co.

**Wire Rope**
Roebling's Sons Co., J. A.

**Wires and Cables**
Acme Wire Co
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
General Electric Co.
Okonite Co.
Roebling's Sons Co., J. A.
Std. Underground Cable Co.
Westinghouse E. & M. Co.

Safety cars
make
safer dividends
when equipped with
"Tool Steel" gears & pinions

Tool Steel Quality

The Tool Steel
Gear and Pinion Co.
CINCINNATI, O.

BRAKE SHOES
AERA Standards
Brake Heads



Diamond "S" Steel Back and Lug Shoes best for all equipment.

Manufactured and sold under U. S. Patent and Registered Trade Mark.

American Brake Shoe and Foundry Co.
30 Church Street, New York
332 So. Michigan Ave., Chicago

If there is anything you want—

or something you don't want that *other* readers of this paper can supply—or use—advertise in the

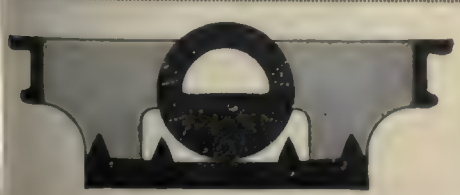
Searchlight Section

*NOW*— is the time to offer good second-hand equipment or machinery for sale. The demand is great for good plant for immediate delivery. That's why you should advertise NOW.

*NOW*— or any other time, use the Searchlight Section for advertising

| | | | |
|---|---|---|---|
| Agencies Wanted | Contracts Wanted | Miscellaneous Wants | Positions Wanted |
| Agents Wanted | Educational Courses | New Industries Wanted | Property For Sale |
| Auction Notices | Employment Agencies | Partners Wanted | Receivers' Sales |
| Buildings For Sale | Exchanges | Patents For Sale | Representatives Wanted |
| Business Opportunities | For Rent Items | Patent Attorneys | Salesmen Wanted |
| Civil Service Opportunities | Franchises | Plants For Sale | Work Wanted |
| Contracts To Be Let | Industrial Sites | Positions Vacant | Etc., Etc., Etc. 35 |

For better Axles Specify
"VALSCO"
HEAT TREATED CAR AXLES
LACLEDE STEEL CO.
Arcade Bldg. St. Louis, Mo.



STUCKI
SIDE
BEARINGS
A. STUCKI CO.
Oliver Bldg.
Pittsburgh, Pa.

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

# ALPHABETICAL INDEX TO ADVERTISEMENTS


Page

A

Acme Wire Co. . . . . 31
Allison Co., J. E. . . . . 21
Allis-Chalmers Mfg. Co . . . . . 32
Alumino-Thermic Corp . . . . . 32
Amer. Brake Shoe & Fdy. Co. . . 39
American Car Co. . . . . 41
American Electrical Works . . 30
American Steel Foundries. . . . . 24
American Steel & Wire Co . . . 31
Anaconda Copper Mining Co . . 30
Anderson Mfg. Co., A. & M. . . 30
Archbold-Brady Co. . . . . 21

B

Babcock & Wilcox Co . . . . . 32
Barbour-Stockwell Co. . . . . 31
Beeler, John A. . . . . 20
Bell Lumber Co . . . . . 40
Bemis Car Truck Co. . . . . 32
Bethlehem Steel Co. . . . . 31
Bonney-Vehslage Tool Co . . . 33
Brill Co., The J G. . . . . 41
Buchanan & Layng Corp . . . . . 21
Bureau of Comm. Economics, Inc. . . . . 21
Byllesby & Co., H. M. . . . . 20

C

Cameron Electrical Mfg Co . 32
Carnegie Steel Co. . . . . 31
Chillingworth Mfg. Co. . . . . 40
Cleveland Fare Box Co. . . . . 34
Collier, Inc., Barron G. . . . . 26
Consolidated Car Fender Co. . . . 34
Consolidated Car Heating Co. . . 16

D

Day & Zimmermann, Inc. . . . . 20
Dayton Mech Tie Co. . . . . 27
Differential Steel Car Co., The . 37

E

Electric Equipment Co. . . . . 35
Electric Ry. Equipment Co. . . . 30
Electric Service Supplies Co. . . 11

Page

F

"For Sale" Ads. . . . . 35
Ford, Bacon & Davis . . . . . 20
Fort Pitt Spring & Mfg. Co. . . 34
Foster Co., Inc., L. B. . . . . 32

G

Galena-Signal Oil Co. . . . . 17
General Electric Co. . 18, Back Cover
Gold Car Heating & Ltg. Co. . . 33
Griffin Wheel Co. . . . . 37

H

Hale Kilburn Co . . . . . 20
Haskelite Mfg. Co. . . . . 21
"Help Wanted" Ads . . . . . 35
Hemphill & Wells . . . . . 20
Heywood Wakefield Co . . . 33
Holst, Englehard W. . . . . 20
Hubbard & Co. . . . . 30
Hyman-Michaels Co . . . . 35

I

International Motor Co. . . . 14-15
International Oxygen Co . . . 32
International Register Co., The. 34
International Steel Tie Co., The . 9
Irvington Varnish & Insulator Co. 33

J

Jackson, Walter . . . . . 20
Jeandron, W J . . . . . 37
Johns-Pratt Co. . . . . 30
Johnson & Co., Inc., J. R. . . . . 40
Johnson Fare Box Co . . . . 34

K

Kuhlman Car Co . . . . . 41

Page

L

Lackide Steel Co. . . . . 39
Lang Body Co. . . . Front Cover
Lapp Insulator Co., Inc. . . . . 30
Le Carbone Co. . . . . 37
Lorain Steel Co. . . . . 31

M

McGraw-Hill Book Co., Inc. . . . 25
McGuire-Cummings Mfg. Co. . . 34
More-Jones Brass & Metal Co . 37
Morton Mfg. Co . . . . . 34

N

Nachod Signal Co. . . . . 30
National Brake Co. . . . . 19
National Pneumatic Co., Inc . . 13
National Ry Appliance Co . . 32
Nichols Lantern Co . . . . 33
Nuttall Co., R D . . . . . 27

O

Ohio Brass Co . . . . . 7
Ohmer Fare Register Co . . . 29
Okonite Co, The. . . . . 32
Ong, Joe R . . . . . 29
Oskel Equipment Co. . . . . 33

P

Panelyte Co. . . . . 33
Perey Mfg. Co., Inc. . . . . 33
Positions Wanted and Vacant . 35

R

Railway Audit & Inspection Co. 21
Railway Track-work Co. . . . . 6
Railway Utility Co. . . . . .
Ramapo Ajax Corp. . . . . .
Richey, Albert S. . . . . .
Robinson Co., Dwight P. . .
Roebling's Sons Co., John A
Rooke Automatic Register Co .

S

St. Louis Car Co. . . . . .
Safety Car Devices Co . . .
Samson Cordage Works. . .
Sanderson & Porter . . .
Searchlight Section . . . .
Shaw, Henry M. . . . . .
Six Wheel Co. . . . . 22
Smith Heater Co., Peter . . .
Standard Underground Cable Co
Star Brass Works . . .
Stevens & Wood, Inc . . .
Stone & Webster . . . .
Stucki Co., A. . . . . .

T

Thornton Trolley Wheel Co. . .
Timken Detroit Axle Co . . .
Tool Steel Gear & Pinion Co.
Transit Equipment Co . . .

U

Universal Lubricating Co.

W

Want" Ads . . . . . .
Wason Mfg Co . . . . . .
Westinghouse Elec & Mfg Co.
Westgh'se Traction Brake Co. .
White Eng. Corp., The J. G. . . .
Wish Service, The P Edw. .
Wood Co., Chas N . . . .



THE SEARCHLIGHT SECTION

*will locate the* Man you want
Position you want
Equipment you want

*Are you using the Searchlight?*



CHILLINGWORTH

One-Piece Gear Cases

Seamless—Rivetless—Light Weight
Best for Service—Durability and Economy. *Write Us.*

Chillingworth Mfg. Co.
Jersey City, N. J.

Northern CEDAR POLES Western

We guarantee
all grades of poles; also any butt-treating specifications

BELL LUMBER COMPANY
Minneapolis, Minn.

"Axle Specialists Since 1866"
Address all Mail to Post Office Box 515, Richmond, Va.

CAR AXLES
J. R. JOHNSON AND CO., INC.

FORGED STEEL AXLES

For Locomotives, Passenger, Freight and Electric Cars
Smooth Forged or Rough Turned—Carbon or Alloy Steel—Plain or Heat Treated, Forged and Turned Piston Rods, Crank Pins, Large Shafts, Round Bars, etc.






# Beaumont Convention Car



## Wins Public Approval

Word comes from Beaumont, Texas, that the seven double-truck Birney Safety Cars recently built at the plant of the American Car Company have received the public's heartiest approval. One car was placed on exhibition in the Interurban terminal in Beaumont and the public given the opportunity to inspect it thoroughly.

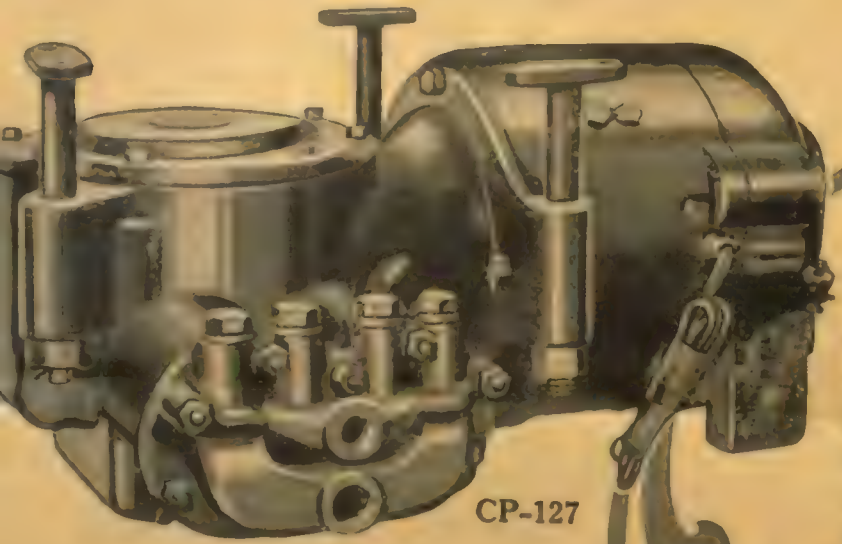
**This is the same type car shown by us at recent Atlantic City Convention. It measures 40 ft. 1 in. overall, seats 48 passengers and weighs 28,500 lb. complete. Trucks are the Brill 77-E-1 type for low-level light-weight cars.**

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

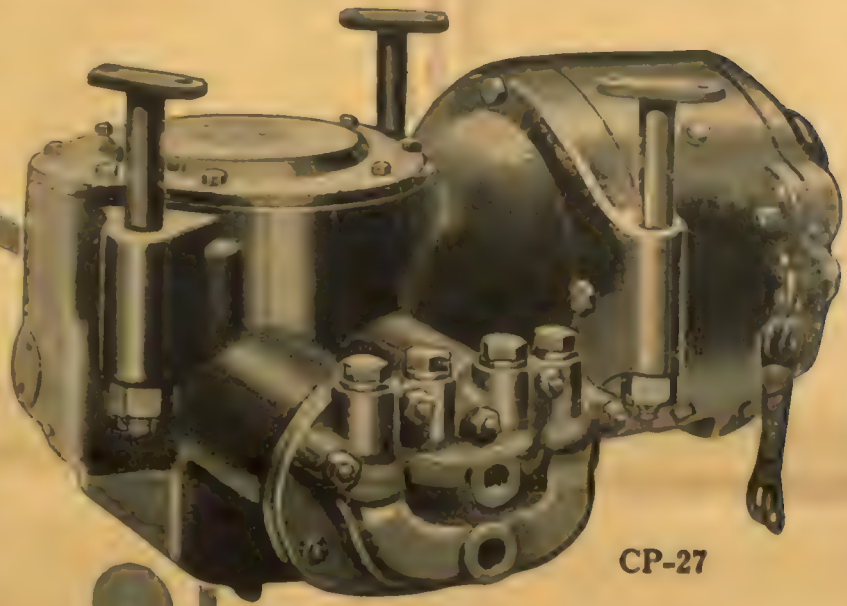
AMERICAN CAR CO. ST LOUIS MO — G.C. KUHLMAN CAR CO. CLEVELAND OHIO — WASON MANF'G CO. SPRINGFIELD, MASS.



# Type CP—*the Low-Maintenance Compressor*

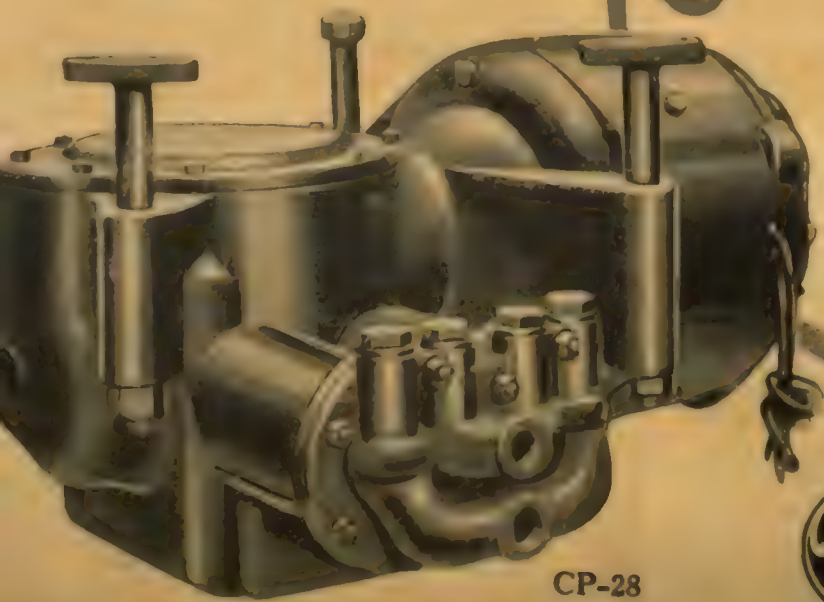


CP-127

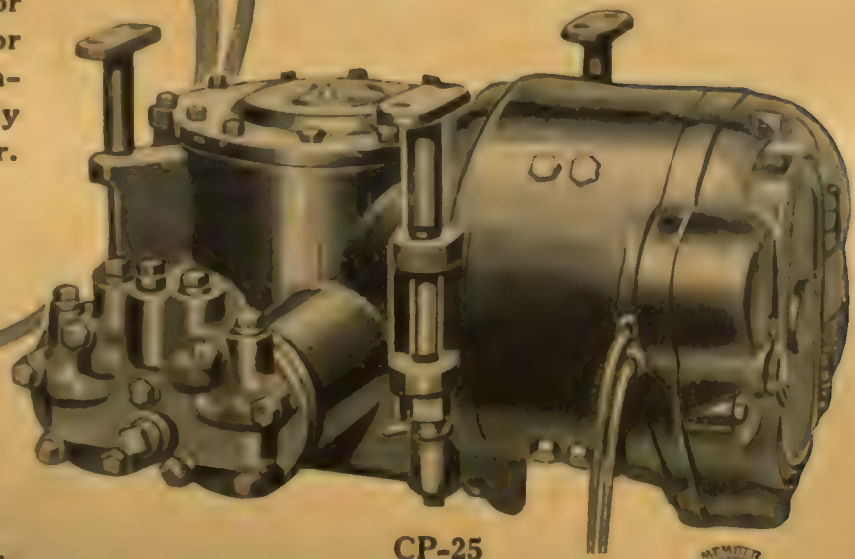


CP-27

THE popularity of the CP Compressor is evidenced by repeat orders—the best recommendation for any machine—received since January 1 for more than 700 new units. The CP line includes designs for any class of service, city or interurban, and the maintenance cost averages only $3 per Compressor per year.



CP-28



CP-25

General Electric Company
Schenectady, N. Y.
Sales Offices in all Large Cities

85-171

# GENERAL ELECTRIC

Graw-Hill Company, Inc. December 6, 1924 Twenty Cents Per Copy

# ELECTRIC RAILWAY JOURNAL







## When Rolling Stock Ceases to Roll—

A dead loss!

And, perhaps, an avoidable loss too—with the STACKPOLE Carbon Brush.

Longer brush life, less side-wear, perfect commutation—these are some of the attributes of the STACKPOLE Brush.

STACKPOLE Grade L-30 is the result of an intensive special study of traction brush requirements. It gives absolute freedom from chipping and pitting. It assures greater economy and longer "rolling-stock life."

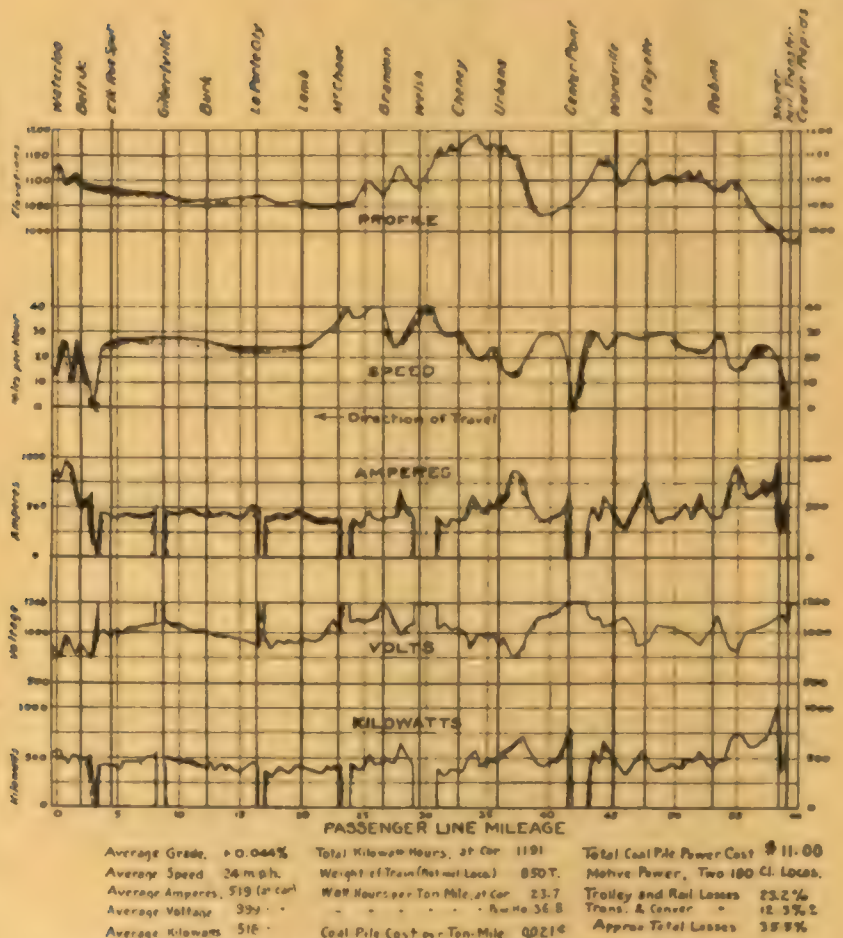
*Send today for STACKPOLE Catalog No. 8*

**STACKPOLE CARBON COMPANY**
**ST. MARYS, PENNA.**

# Stackpole carbon brushes
## the Better Brushes with the Longer Life



# Figure It Out!




PERFORMANCE DIAGRAM
11 CAR STEEL PASSENGER TRAIN
CEDAR RAPIDS TO WATERLOO
MAY 21, 1924.

This is a performance diagram of the 850 ton, eleven-car excursion train of the Milwaukee Association of Commerce between Cedar Rapids and Waterloo, Iowa, on May 21, 1924, hauled by two standard 60 ton Baldwin-Westinghouse locomotives over the Waterloo, Cedar Falls and Northern Railway.

Ten interurban railways, operating a total of 56 locomotives, report an average figure of locomotive maintenance of 6.25 cents per locomotive mile.

If these figures applied to freight interchange service with connecting steam roads, would it be profitable?

FIGURE IT OUT!

BW

The Baldwin Locomotive Works
Philadelphia, Pa.
Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.

W WESTINGHOUSE ELECTRIC

# Baldwin-Westinghouse

ol. 64, No. 23 New York, December 6, 1924 Pages 945-982

# ELECTRIC RAILWAY JOURNAL

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

ORRIS BUCK
ociate Editor
W. SQUIER
ociate Editor
HN A. MILLER, JR.
ociate Editor
J. MACMURRAY
ws Editor

CHARLES GORDON
Western Editor
Old Colony Bldg., Chicago
MERRILL B. KNOX
Editorial Assistant
Old Colony Bldg., Chicago
CARL W. STOCKS
Associate Editor

## CONTENTS

**litorials** ..... 945

**orty Years of "Electric Railway Journal"** ..... 947
storical sketch of the beginning, development, policies and serv- rendered by a publication which for forty years has been the ncipal medium for disseminating news and technical informa- n of the street and interurban railways.

**ises Run Along Paul Revere's Route** ..... 955
storic towns in eastern Massachusetts formerly served by gle-track lines of the Middlesex & Boston Street Railway now ve bus service operated by the same company. More economi- l operation has been obtained on routes where the traffic is ht.

**he Readers' Forum** ..... 957

**ssociation News and Discussions** ..... 958

**idwest Has Good Meeting in St. Louis** ..... 958
sociation hears papers on street congestion, noise reduction, bus eration, freight haulage, the future of the interurban and many ases of electric railway work of current interest.

**ty Transportation and Street Congestion** ..... 960
r C. E. SMITH.
portance and permanence of the street railway in any scheme local transportation, and various methods of relieving street ngestion, speeding of cars and attracting patronage.

**he Articulated Car** ..... 963
r W. G. GOVE.
résumé of existing designs of this type of car for surface line pid transit and railroad service.

**anker Urges Caution in Customer Ownership** ..... 967

**aintenance of Equipment** ..... 968

**ews of the Industry** ..... 971

**inancial and Corporate** ..... 977

**ersonal Mention** ..... 980

**anufactures and the Markets** ..... 981

**cGraw-Hill Company, Inc., Tenth Ave. at 36th St., New York**

MES H. MCGRAW, President
PHER J. BALDWIN, Vice-President
OOLM MUIR, Vice-President
J. MEHREN, Vice-President
SON BRITTON, Vice-President
MES H. MCGRAW, JR., Vice-Pres. and Treas.
H. THOMPSON, Secretary

SHINGTON:
Colorado Building
CAGO:
Old Colony Building
ADELPHIA:
Real Estate Trust Building
VELAND:
Leader-News Building
LOUIS:
Star Building
N FRANCISCO:
883 Mission Street
NDON:
2 Bouverie Street, London, E. C. 4

Member Associated Business Papers, Inc.
mber Audit Bureau of Circulations

1924

Cable Address: "Machinist, N. Y."
Publishers of
*Engineering News-Record*
*American Machinist*
*Power*
*Chemical and Metallurgical Engineering*
*Coal Age*
*Engineering and Mining Journal-Press*
*Ingeniería Internacional*
*Bus Transportation*
*Electric Railway Journal*
*Electrical World*
*Electrical Merchandising*
*Journal of Electricity*
*(Published in San Francisco)*
*Industrial Engineer*
*(Published in Chicago)*
*Electrical Retailing*
*(Published in Chicago)*
*American Machinist—European Edition*
*(Published in London)*

e annual subscription rate is $4 in the United States, Canada, Mexico, Alaska, waii, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, lombia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brazil, ile, Uruguay, Costa Rica, Ecuador, Guatemala and Paraguay. Extra foreign tage to other countries $3 (total $7 or 29 shillings). Subscriptions may be sent the New York office or to the London office. Single copies, postage prepaid to any t of the world, 20 cents.

ange of Address—When change of address is ordered the new and the old address st be given, notice to be received at least ten days before the change takes place.

pyright, 1924, by McGraw-Hill Company, Inc.

blished weekly. Entered as second-class matter, June 23, 1908, at the Post Office, New York, under the Act of March 3, 1879. Printed in U.S.A.

## *40 Years of Service*

IN THE leading text pages of this week's issue is told the story of ELECTRIC RAILWAY JOURNAL—how it has grown in its 40 years, almost the entire lifetime of the street railway industry. Its influence in the development of the electric railway and transportation in general has been potent.

But this is not the whole picture. This editorial service has been accompanied by another important service to the readers. The advertising pages all these years have been telling of the equipment and devices that have made progress possible. Manufacturers and dealers have realized that the pages of the JOURNAL furnished the surest means of getting the attention and interest of the responsible railway men. All have profited thereby.

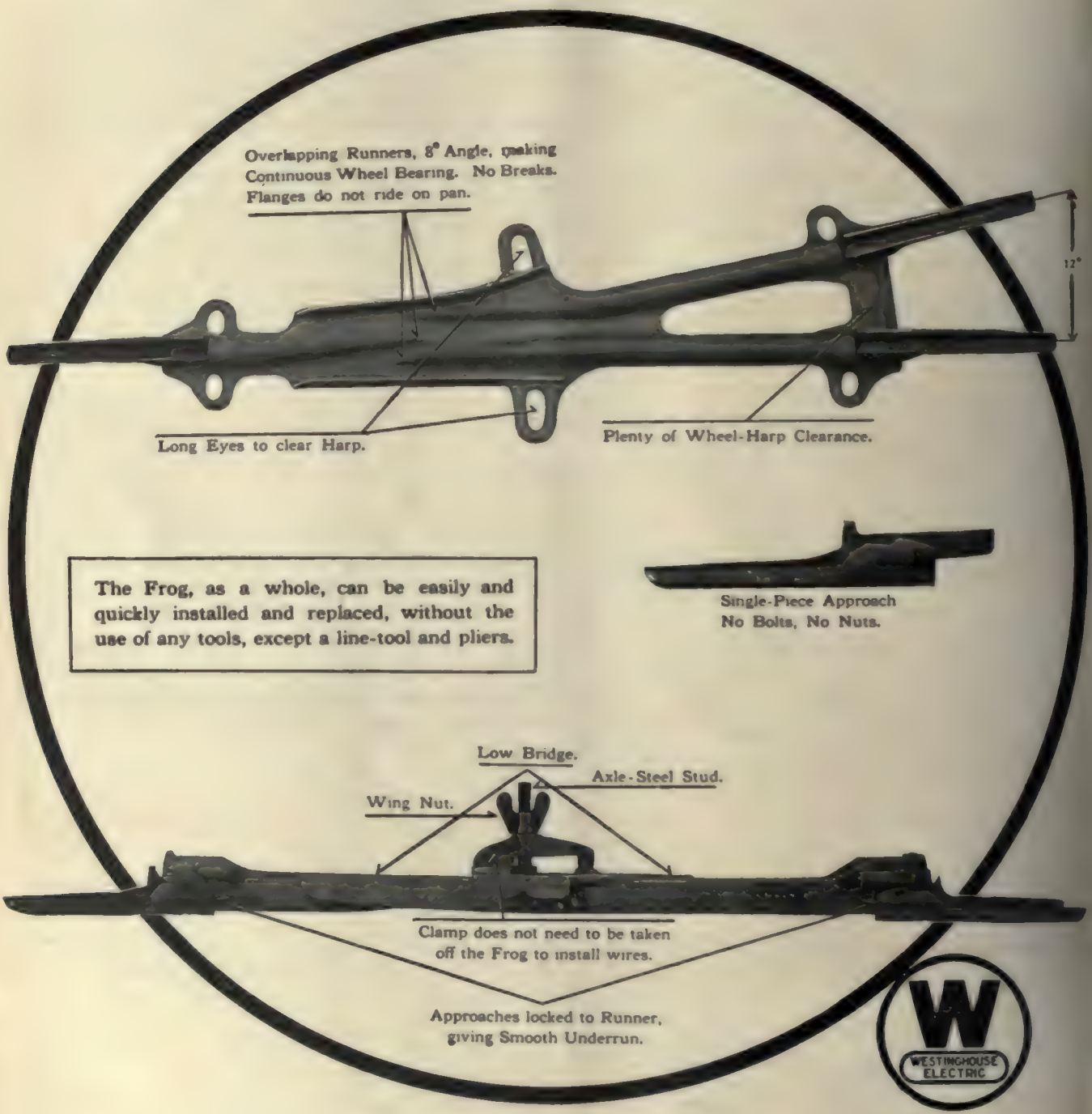
Modernization goes on. What is new today is old tomorrow. The youngsters of today will be the leaders of tomorrow. It is our job to acquaint them with methods and practices that represent the experience of 40 years. And the new things to come must be described to old and to young alike.

This issue tells something of the past 40 years. But the JOURNAL has its face toward the next 40 years, for it sees a further great development of the industry—both railway and highway. It is building for the future, with its 40 years experience as a guide to future leadership.

**mber of Copies Printed, 6,250**

**Advertising Index—Alphabetical, 60; Classified, 56, 58; Searchlight Section, 55**

# The CF Frog with Bayonet Approach Quickly Installed



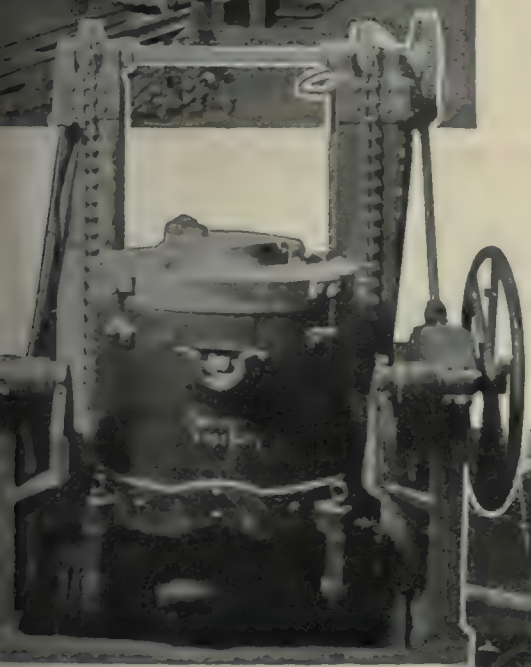

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in all Principal Cities of the United States and Foreign Countries.

# Westinghouse

A MANUFACTURING O-B SERVICE FOR THE INDUSTRY







# ELECTRIC FURNACES

Electric Furnaces take their place in the O-B Manufacturing process because they lead to more ideal foundry conditions—especially from the humane standpoint.

But even so, the quality of O-B Bronze depends on how the metal is handled in these furnaces, and in the pouring. The constant supervision of skilled metallurgists over these processes brings to users of O-B Bronze Products the expected qualities with which the O-B name is associated.



The Ohio Brass Co.
Mansfield, Ohio, U.S.A.

OLLEY MATERIAL — ELECTRIC RAILWAY CAR
EQUIPMENT — RAIL BONDS — HIGH TENSION
RCELAIN INSULATORS — THIRD RAIL INSULATORS
NEW YORK — PHILADELPHIA — PITTSBURGH
CHICAGO — CHARLESTON, W. VA.
LOS ANGELES — SAN FRANCISCO — PARIS, FRANCE

Dominion Insulator & Mfg. Co., Limited Niagara Falls, Ontario, Canada

# Noise is waste

Noise isn't merely objectionable, it's wasteful. It's an indication of wasted energy and an excessive rate of deterioration of one or more parts of the railway property. Where there's noise there's wear.

Bad track is at least as likely as bad cars to be a nuisance. Even bad cars are quieter on good track. Even good cars are noisy on bad track. Electric Railway Journal wisely says:

> *"Corrugated rail, loose switches and worn-out crossings should receive prompt attention or the reputation of the railway will suffer."*

And here's the approved equipment for keeping track at its best.

*Write for quotation now*

**Railway Track-work Co.**

3132-48 East Thompson Street, Philadelphia

AGENTS:
Chester F. Gailor, 30 Church St., New York
Chas. N. Wood Co., Boston
Electrical Engineering & Mfg. Co., Pittsburgh
Atlas Railway Supply Co., Chicago
Equipment & Engineering Co., London

(333)



"Reciprocating" Track Grinder



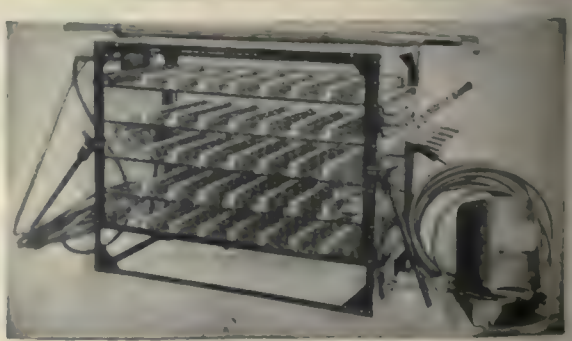
"Vulcan" Rail Joint Grinder



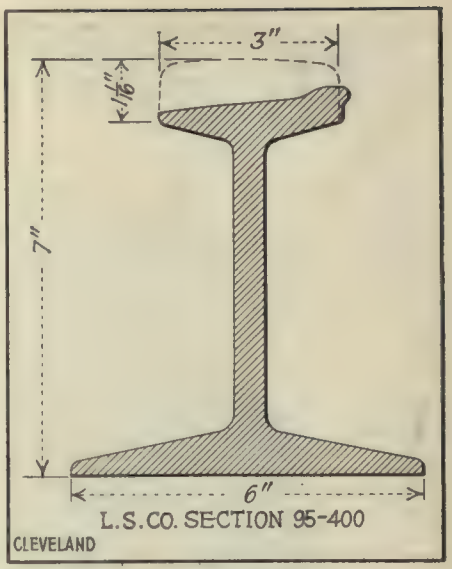
"Atlas" Rail Grinder



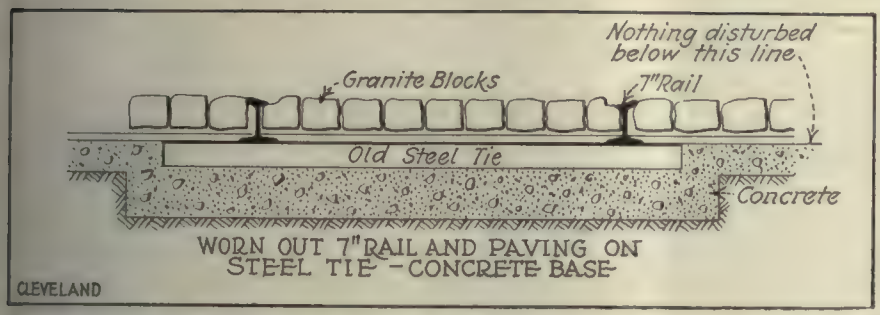
"Hercules" Swing Frame Rail Grinder



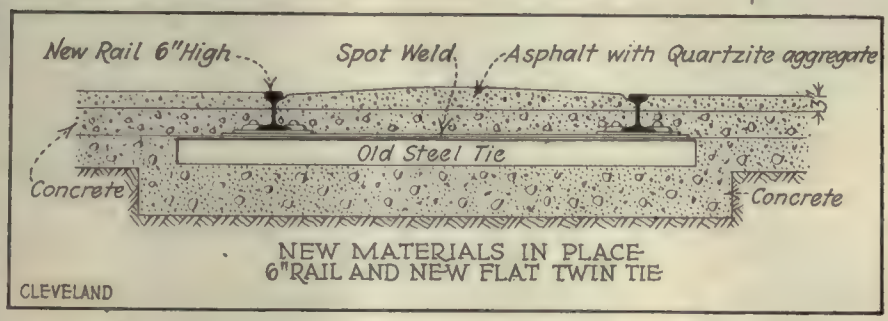
"Ajax" Electric Arc Welder




Cross Section of Rail on Euclid Ave., Cleveland, Showing Wear on Ball of Rail




Cross Section Showing Details of Track Construction on Euclid Avenue, Cleveland. Rail Worn Out, Concrete Base Still in Good Condition.




Details of method of Replacing Rail on Old Concrete Base, Using Special Flat Steel Twin Ties.

# Low Cost Construction that Outlasts the Rail

The most startling development in track construction for paved streets has been successfully worked out during the past two years in the renewal of rail and paving on a Steel Tie Concrete Base.

Planning your new paved track for renewal by using Steel Twin Tie Construction will require no large investment in initial cost. Our definite cost records for 1924 show costs as low as $8.35 per single track foot for the track complete, including removal of the old construction and concrete paving surface.

For conservative-minded executives who have questioned the comparative life of concrete construction there is a complete answer in the reconstruction of such track at the end of a satisfactory rail life in Cleveland and elsewhere.

In planning 1925 paved track construction investigate the low cost paved track construction that outlasts the rail with all assurance that asking us to present all the data by personal call or in the mail will involve no persistent or annoying solicitation.

**The International Steel Tie Co., Cleveland, Ohio**

# Steel Twin Tie Track

**Renewable Track · · Permanent Foundation**

# *Modern Signal Protection*



Electro-Pneumatic Interlocking at Terminal Station of Philadelphia & West Chester Traction Co.

At the new Philadelphia Terminal Station of the Philadelphia & West Chester Traction Co., UNION ELECTRO-PNEUMATIC INTERLOCKING allows car movements to be speeded up and insures against confliction of simultaneous movements.

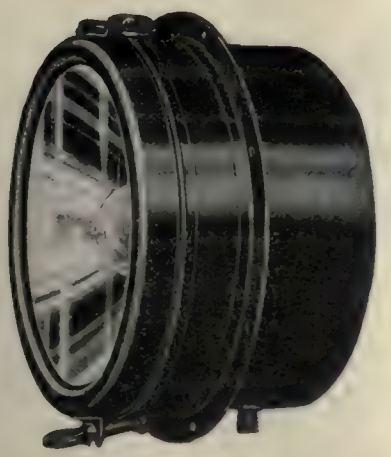
*Let one of our engineers study your operating conditions and co-operate with you in considering what Interlocking and Automatic Block Signals will do for your Railway.*

Trade Mark

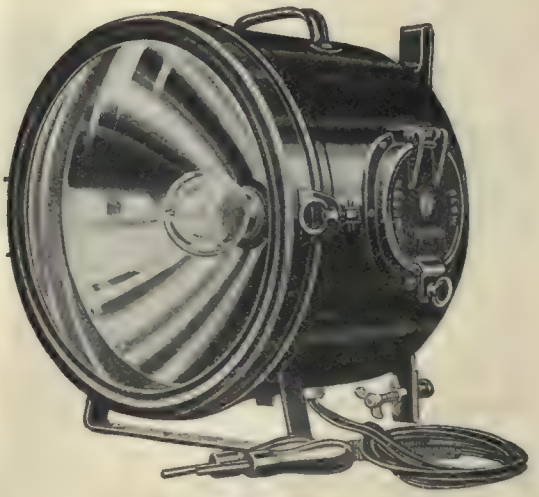
## Union Switch & Signal Co.

SWISSVALE, PA.

Trade Mark



Dash Type



Portable Type

# GOLDEN GLOW

## Powerful non-glaring headlights

KNOWN wherever they're seen, by their characteristic soft but penetrating beam of golden yellow light. Golden Glow Headlights are particularly popular because of the absence of blinding or dazzling rays, yet they cut through fog, dust, smoke or mist with powerful illuminating effect, which lights the pathway and enhances the safety of night operation.

**Made in various types and sizes to meet all railway car and motor bus requirements.**
***Read descriptions in your ESSCO Catalog No. 7.***

## ELECTRIC SERVICE SUPPLIES CO.

PHILADELPHIA
17th and Cambria Sts.
PITTSBURGH
829 Oliver Building
NEW YORK
50 Church St.
SCRANTON
316 N. Washington Ave.
CHICAGO
Monadnock Bldg.
BOSTON
88 Broad St.
Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Vancouver





# As the heart functions—

—to pump life blood through the human organism, so the compressor acts as a correspondingly vital element of the air brake system in providing "fluid" for actuating the brake.

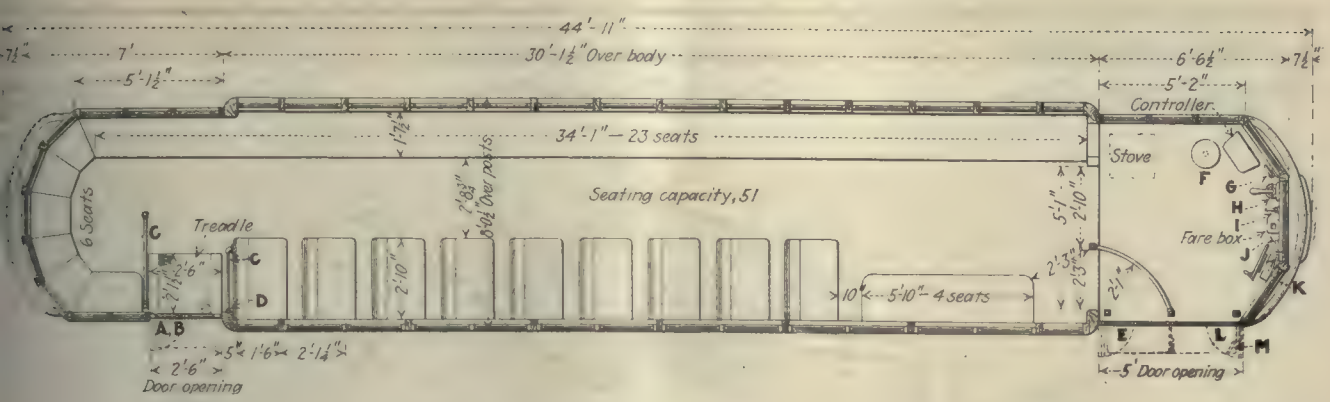
Westinghouse Air Compressors are built to meet the severe demands of street railway service. No "organic" defect is in their make-up, and only a reasonable amount of care and attention is needed to avert "functional" trouble. If maintained in a normal state of health they will need no "doctoring," and a long life of usefulness and efficient service is assured.

The "Bungalow" Compressor, built in sizes suitable for all classes of traction service, has proved to be a favorite because of its compact design, light weight, extreme accessibility, and dependable performance. Other types and sizes of Westinghouse Air Compressors have given a correspondingly high degree of satisfaction

**Westinghouse Traction Brake Co.**
*General Offices and Works:*
Wilmerding, Pa.

# WESTINGHOUSE TRACTION BRAKES

2143




# Toronto's Remodeled Cars have AUTOMATIC EXIT DOORS

LIKE Chicago, Ill., and Washington, D. C., and Dallas, Tex., Toronto has taken up the automatic door in earnest. Toronto is converting sixty cars to automatic door exit as shown above.

The Automatic Door speeds up passenger interchange without attention from the car operator. It is absolutely safe through interlocking with car control and brakes.

## It's NATIONAL PNEUMATIC EQUIPMENT



**National Pneumatic Co., Inc.**

*Originators and Manufacturers*

***Executive Office:* 50 Church Street, New York**

Philadelphia—1010 Colonial Trust Building Chicago—940 McCormick Building

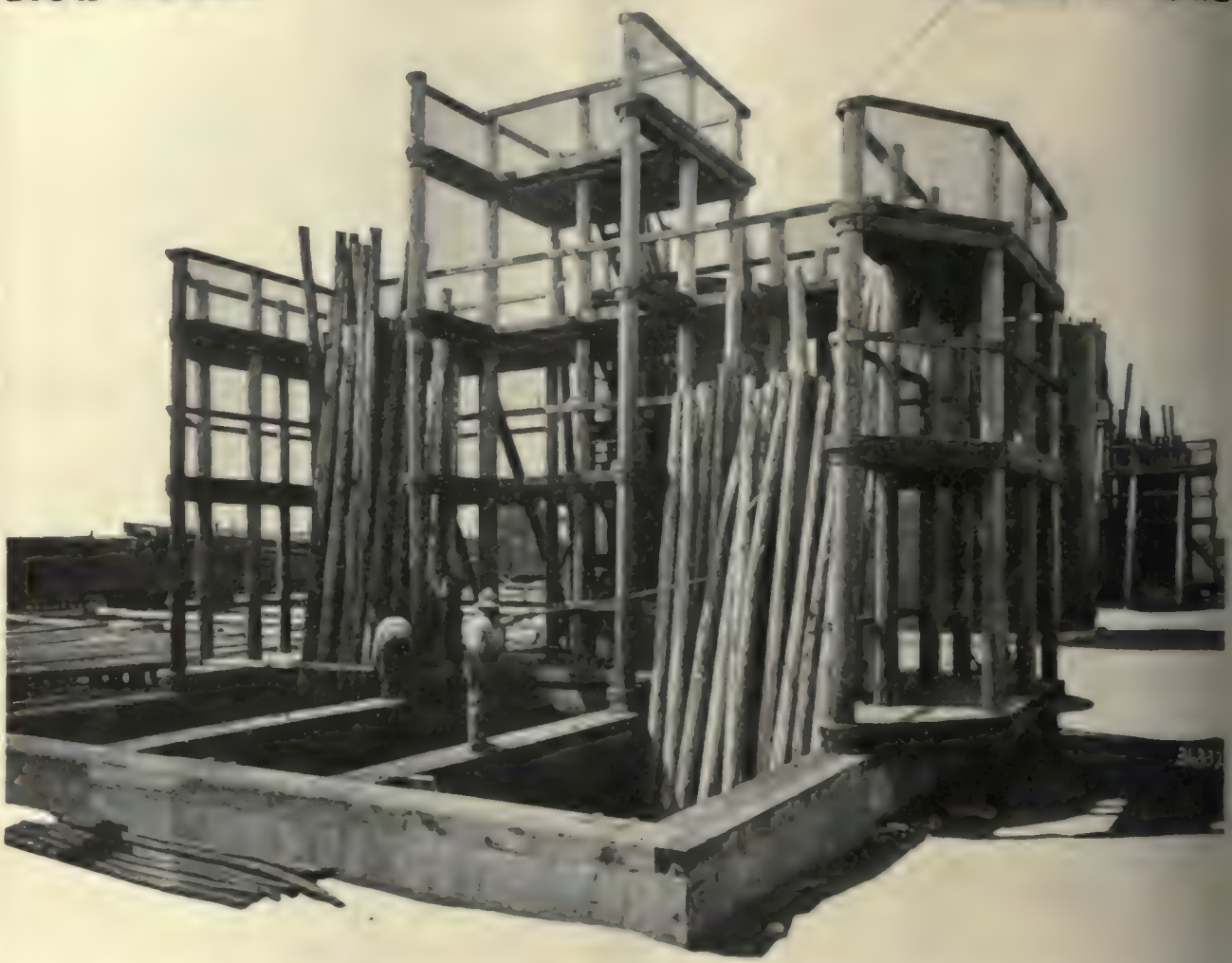
General Works—Rahway, New Jersey

*Manufactured in Canada by Dominion Wheel & Foundry Co., Ltd., Toronto, Ont.*

**Western Red Cedar**

**Light, Durable and Strong Plain or Treated Poles**

**Northern White Cedar**



NPCo

This stamp on the butt of every pole identifies and guarantees it as National Pole Quality.

## *Veritable Fountains of Youth*

In every field of endeavor from time immemorial, men have sought the secret of prolonging life—their own and the products of their hands.

In the great vats of the National Pole Company there is a fountain of youth for Cedar Poles, the result of long continued research on the part of the Department of Research and Preservation of the National Pole Company. These men have achieved success. They have added many, many years to the service life of cedar poles and the National Pole stands today years beyond the life that it ever stood before. It stands as a monument to their work.

# NATIONAL POLE COMPANY

**Escanaba, Michigan**

*Distributors:*

*Western Electric Company*

# Operating electric railway cars has taught you—



## 1. *The Value of Seating Capacity!*

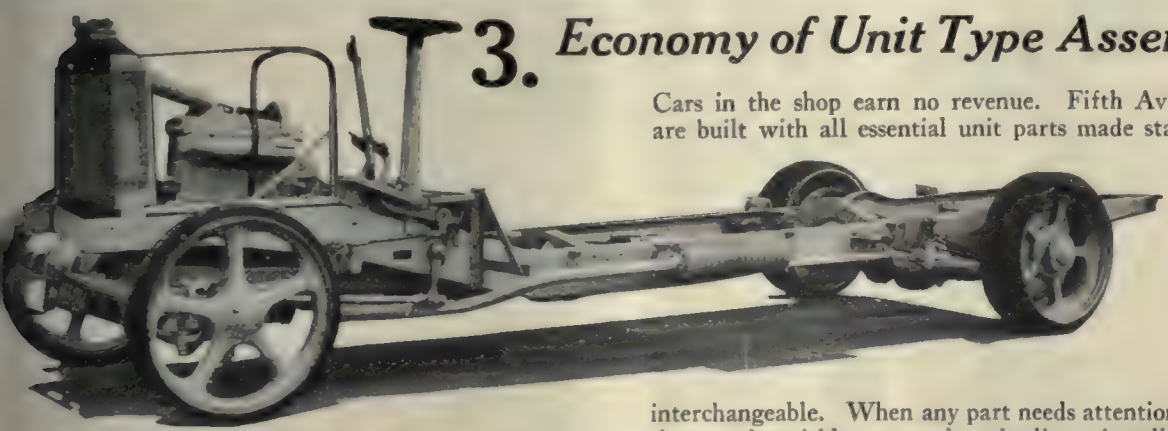
The single truck safety car of 1917 was a valuable experiment, but it soon developed into the bigger double-truck one-man car, seating 44 to 48 passengers.

In motor bus operation Fifth Avenue Double Deckers are the answer to the capacity question. Our Type L Bus seats 55 passengers, in a short vehicle occupying only 3.4 sq.ft. of street area per seated passenger.



## 2. *Popularity of the Open Air Car Ride!*

Remember how the public used to patronize the old cross-bench open car. You had to abandon it because it didn't pay to keep double equipment. Today, Fifth Avenue double-deckers are re-establishing the popularity of the open air ride, and the same buses, with the adjustable all-weather top, operate to full seating capacity in the coldest weather.



## 3. *Economy of Unit Type Assembly!*

Cars in the shop earn no revenue. Fifth Avenue Buses are built with all essential unit parts made standard and interchangeable. When any part needs attention or repair, the part is quickly removed, a duplicate installed and the bus is ready for the road. Engine, radiator, transmission, clutch, rear end, or other part can then be repaired at leisure.

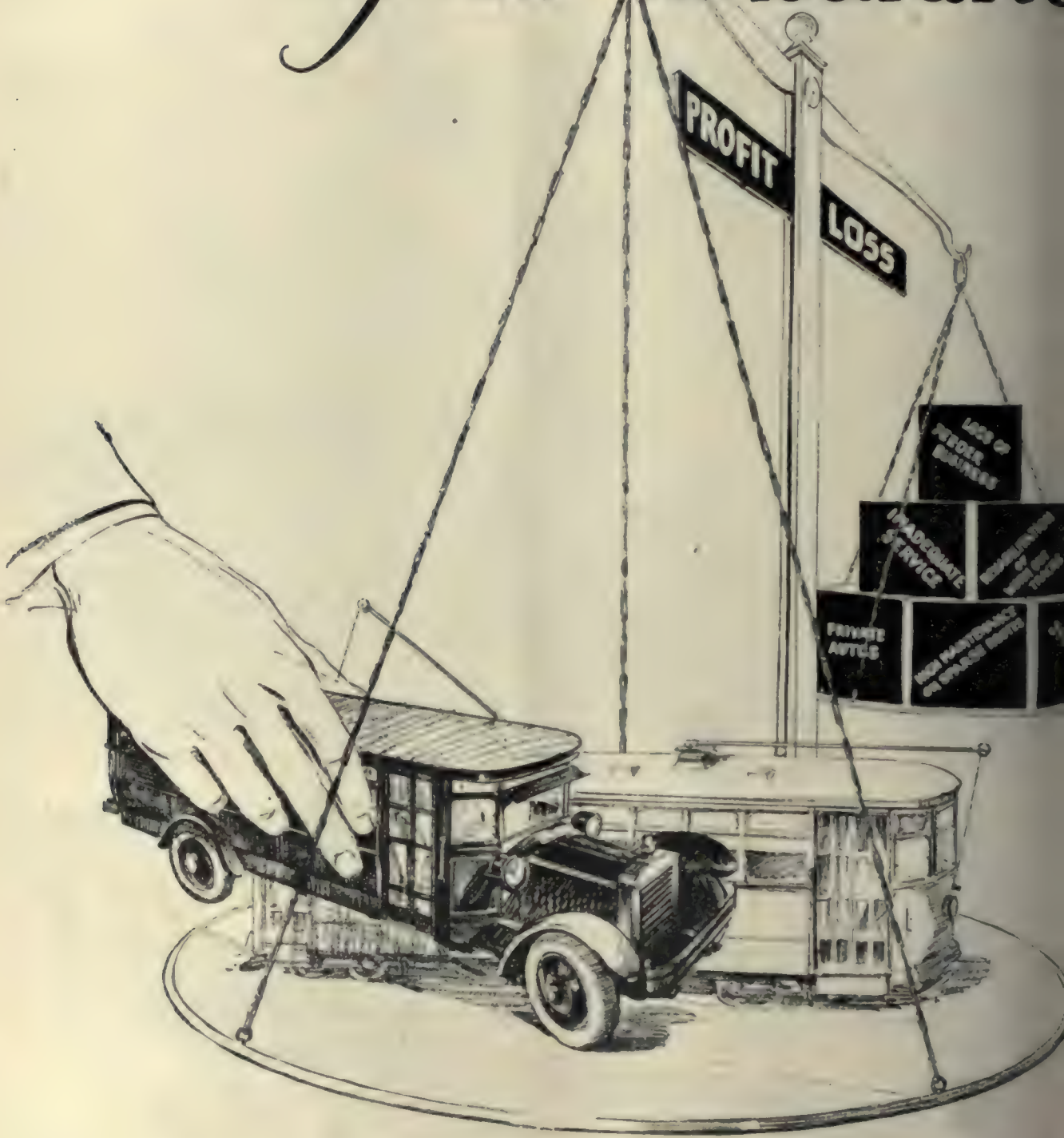
### Apply these lessons to the bus problem!

When choosing the best type and make of motor bus to meet your requirements, bear in mind that Fifth Avenue Buses are built by an organization which has been meeting successfully these same transportation, operating and maintenance problems for many years. Type L Fifth Avenue Buses are the logical and practical automotive carrier for the Electric Railway which is adding bus service to its existing rail system.

**NEW YORK TRANSPORTATION CO.**
*New York, N.Y.*

# FIFTH AVENUE BUSES

# Now to balanc




"The people demand the most modern in transportation as in everything else, and if local transportation is to be treated as a monopoly, then the company supplying the service must be prepared to give the people what they want."

*—the opinion recently expressed by a prominent Southern Electric Railway man.*

# ne Profit scale - - -

ompetition,—heavy maintenance of nprofitable "sparse" routes,—costly habilitation of worn out track on our lines, and loss of business through eneral inadequate service! All figure retty big in electric railway conferences of late.

he more electric railway men come study these problems and appreciate eir seriousness, the more they realize the value of the bus as a profitable ly.

no way could competition better be et than with the inauguration of an fficient, dependable Mack Bus service, o-ordinated with regular car lines.

And how better eliminate the costly maintenance factor on "sparse" routes than by filling the tracks and substituting low-cost high-profit Mack Buses?

Then again on worn out spur lines, and as a feeder service in newly developed districts beyond existing terminals, Mack Buses make operation profitable by eliminating the disproportionate expense of installing new track and overhead.

Mack design and construction result in a passenger vehicle that is all bus from bumper to tail light, bringing operating cost down to a point where electric railways can realize a substantial profit. Mack exclusive mechanical features make dependability in daily operation more than a mere ideal.

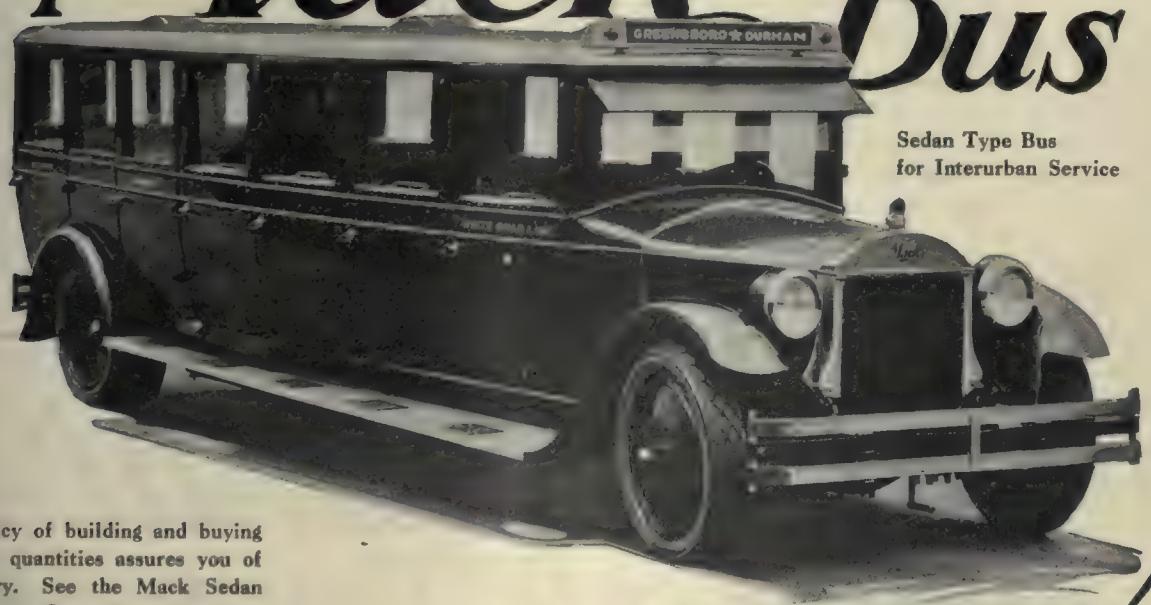
MACK TRUCKS, INC.

INTERNATIONAL MOTOR COMPANY

25 Broadway New York City

Eighty-three direct MACK factory branches operate under the titles of: "MACK MOTOR TRUCK COMPANY" AND "MACK INTERNATIONAL MOTOR TRUCK CORPORATION"

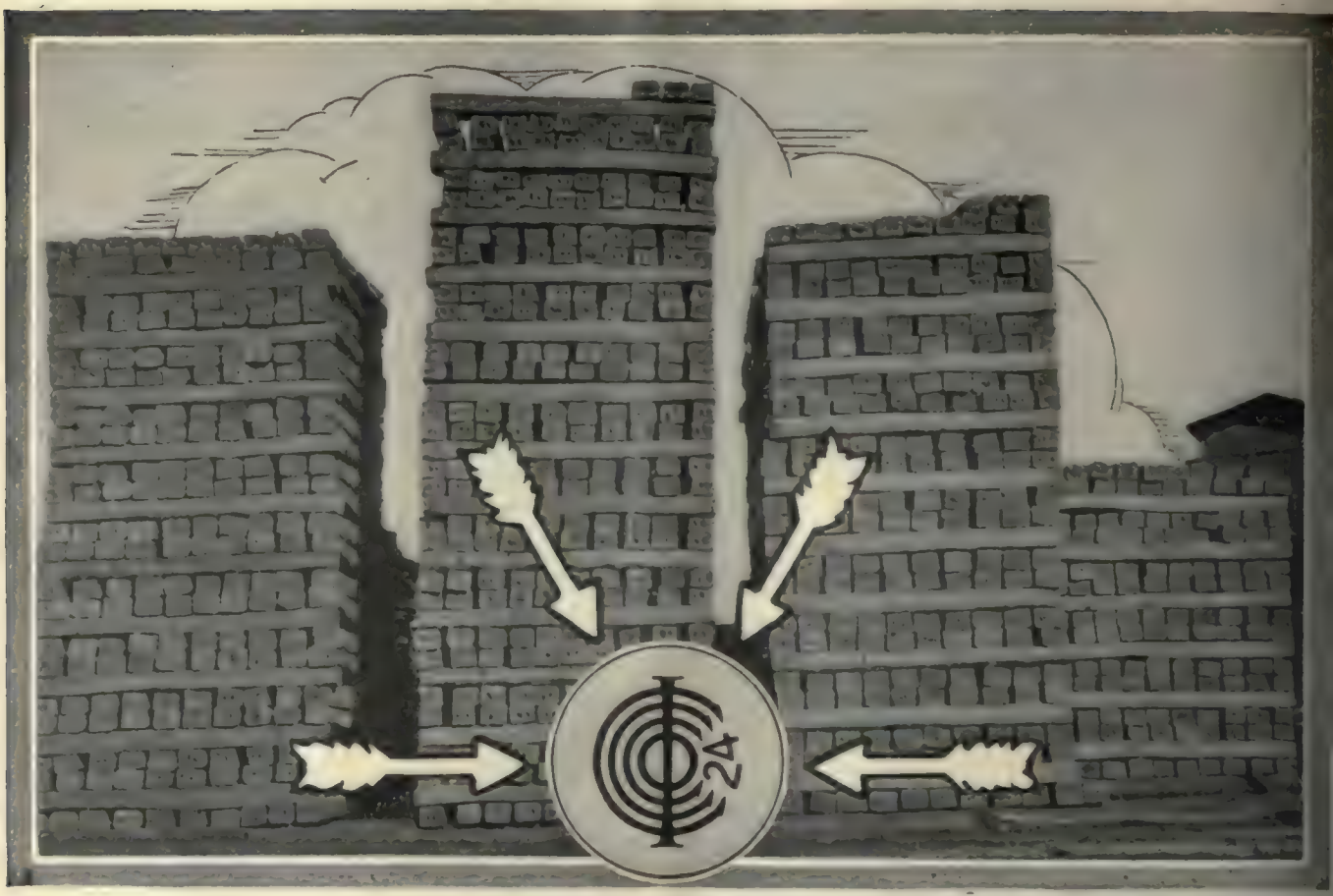
The Mack Bus




Sedan Type Bus
for Interurban Service

e Mack policy of building and buying dies in large quantities assures you of mpt delivery. See the Mack Sedan the showroom floor nearest to you.

*Performance counts!*



*Note the uniformity of these Grade 2 and 3 ties and how carefully they are stacked high from the ground on creosoted poles.*

# Genuine Assurance of Tie Quality

THE railroad that is burdened with the expense of decayed, over-graded, or inferior ties should try ***International*** Tie Service. This service eliminates the uncertainty of tie buying, for ***International*** Tie Service is confined to the sale and delivery of sound, full size, Standard Specification Ties, marked with the ***International*** dating nail—the 18 Karat Mark of Tie Quality placed in every tie.

This dating nail not only insures protection to your investment at the time of initial purchase of ties, but results in a saving in track maintenance due to longer tie life and fewer tie renewals, either of which is big enough and positive enough to command your thorough investigation.

*Contract with International now—the future will thus be assured.*

**International Creosoting & Construction Co.**

General Office—Galveston, Texas

Plants: Texarkana, Texas, Beaumont, Texas, Galveston, Texas

# International Standard Specification Ties

## Bay State Completely Equipped

In 1918 the Bay State System, now the Eastern Massachusetts Street Railway, installed 1239 ECONOMY Meters. This road has since purchased additional ECONOMY Meters for all new equipment.

The power saving induced by this large installation paid for the meters during the first year. In addition, the meters proved to the Company the high value of car inspection on a kilowatt-hour basis.

As a result, the Bay State System, in 1921, contracted for Inspection Dials for the meters on 700 active cars, which include 251 new Safety cars.

Thus the Bay State System operates an ECONOMY Meter on every one of its regular cars and *inspects every car on the kilowatt-hour basis.*

Mr. W. C. Bolt, Supt. of Rolling Stock and Shops, in a paper delivered before the New England Street Railway Club, Oct. 30, 1924, commenting on the value of the inspection dials, said: "I might state right here that early in 1921 it was decided to place our car maintenance on a systematic basis, and to accomplish this, power meters were installed on each active car equipped with so-called "inspection dials". These "inspection dials" automatically indicate when a car has operated approximately 1,000 miles, at which time it is given a car house inspection, and again when the car has operated 60,000 or 75,000 car-miles, at which time it is given a general shop overhaul.

*"These power meters have materially assisted us in determining promptly and at a minimum cost when individual cars become due for attention."*


*"The accepted standard of maintenance which prevailed five or ten years ago cannot prevail today"* —W. C. BOLT



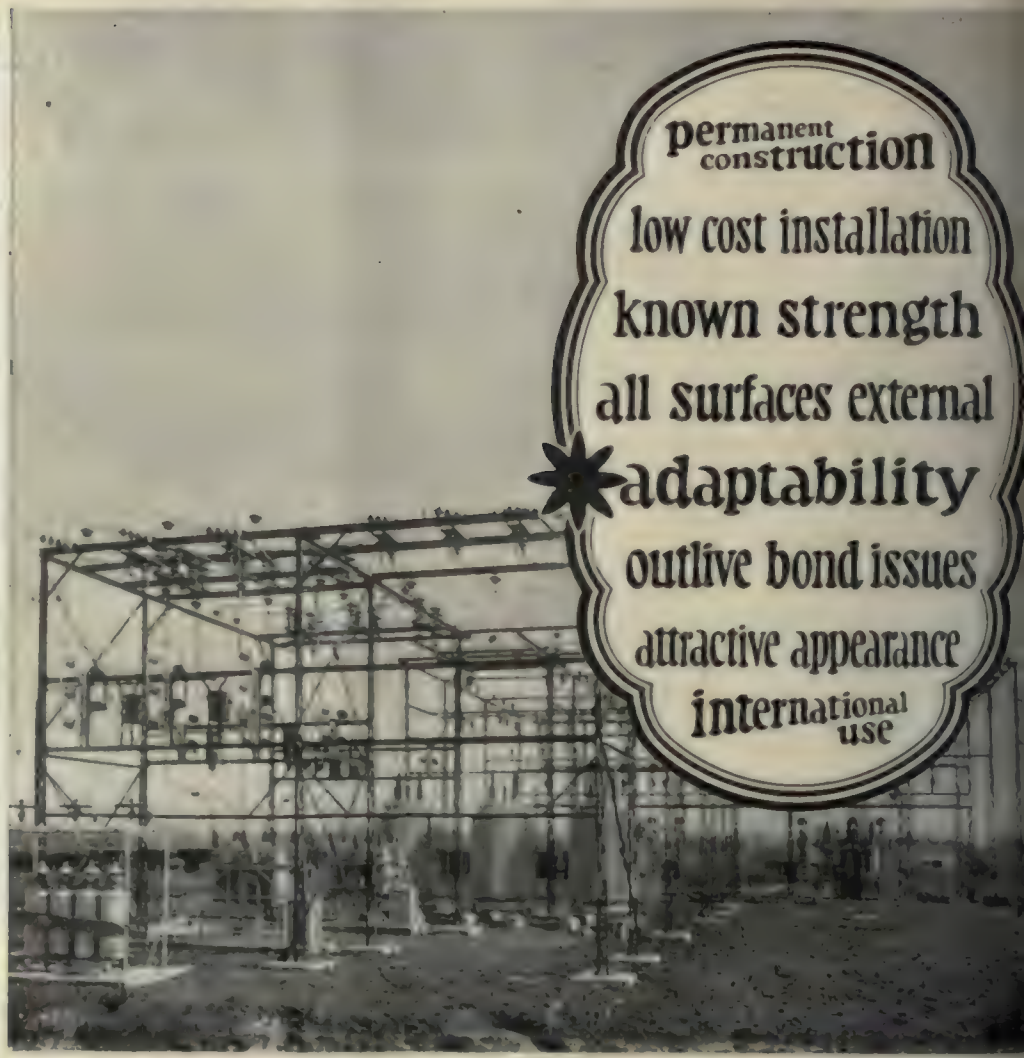
## The Accepted Standard Today

Many properties regard the car inspection dials on ***Economy Meters*** as the basis for a systematic and scientific method of car maintenance.

With Economy Meters they are saving power at the car, labor at the car house and are providing efficient and uninterrupted service to the public. Let us prepare an estimate for your property.

**Economy Electric Devices Co.**
Old Colony Bldg., Chicago

**ECONOMY METERS** *with car inspection dials . . . .*




## ADAPTABILITY

★ The wide adaptability of Bates poles makes them applicable for every pole purpose.

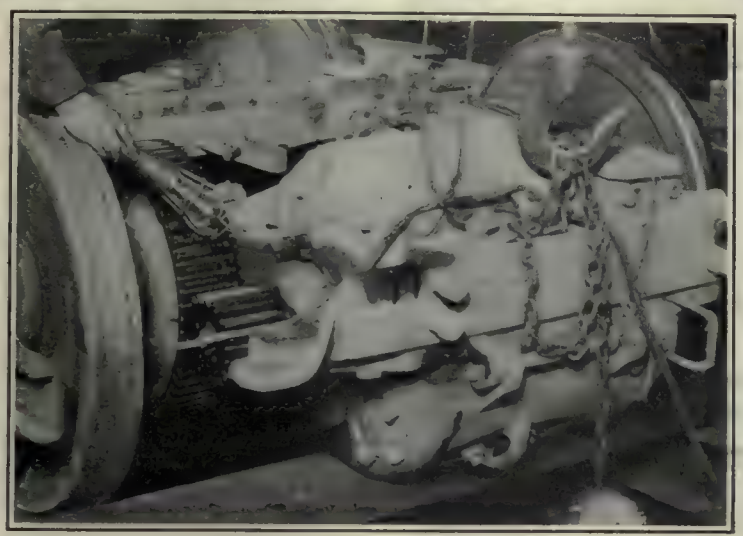
They readily and economically adapt themselves to fabrication into combination poles, towers, A frames and H frames—and for substation construction. As trolley supports, for signal tower use, as transformer rack frames, and as street light standards—they are used to advantage.

Get a Bates quotation for consideration and comparison!

Bates Expanded Steel Truss Co.
Illinois Merchants Bank Bldg.
Chicago, Ill., U. S. A.

BATES ONE PIECE EXPANDED STEEL POLES

# Galena Oils and Service



## A saving worth while

Gear lubrication presents a striking example of the effect of friction on power consumption—*the friction of resistance offered by the body of the lubricants used.*

Galena Gear Grease is a product made specially for the particular function of gear lubrication. It has a light, even, oily body that cushions and protects the gear teeth without retarding their continuous meshing action.

The introduction and use of "tacky," or sticky grease for this purpose invited comparison of the service efficiency of Galena and the other products. Tests were conducted by recognized engineering authorities to determine the relative coefficient of friction.

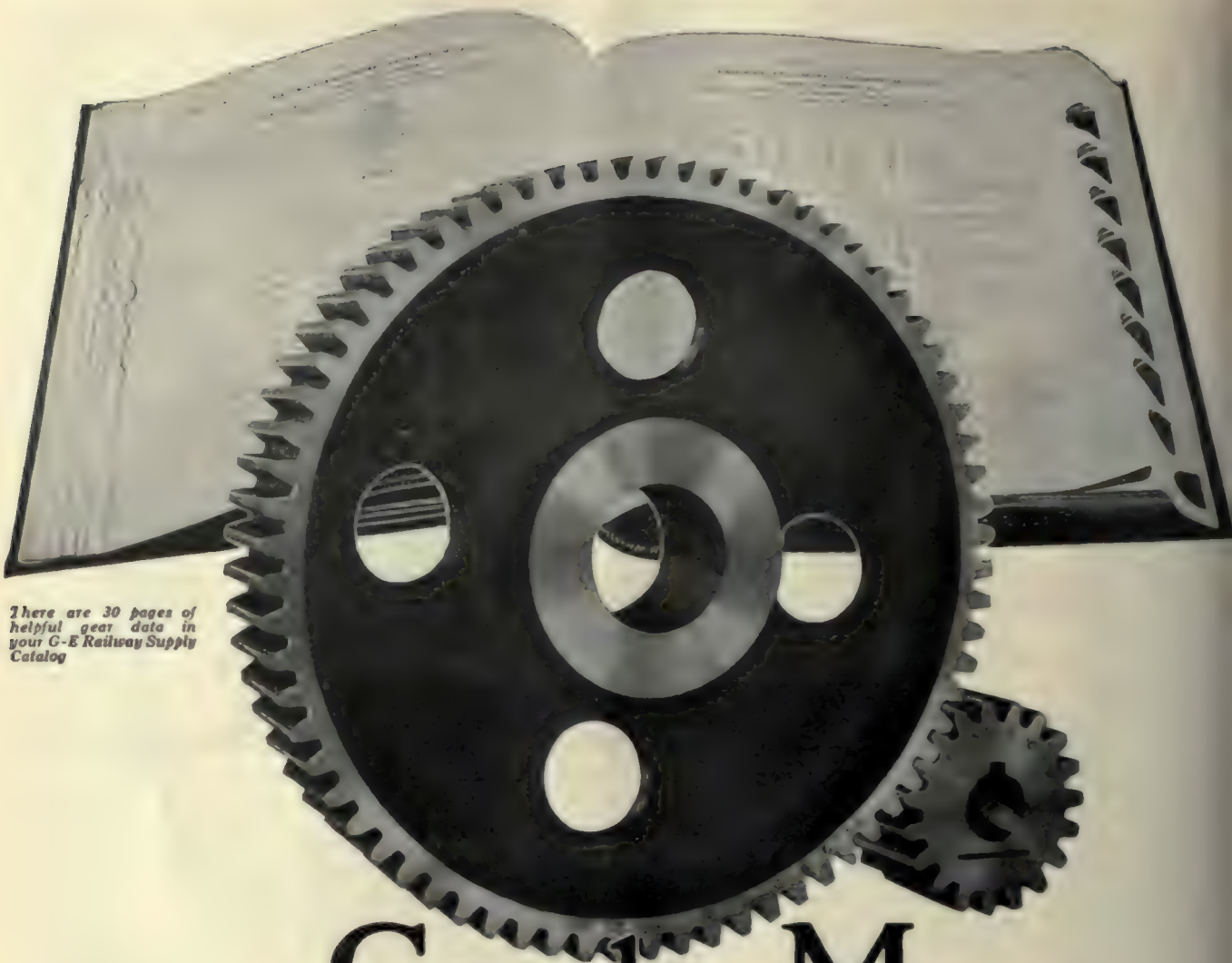
At the rate of one cent per K.W.H.—a most conservative estimate of power cost—the lower coefficient of Galena Gear Grease represented a saving in annual power cost of $21.24 for a two-motor car, or $42.48 for a four-motor car. This on a basis of eight hours per day service.

Multipled by the number of cars that a road operates, the total value of the excess power consumed annually if unsuitable lubricants are used for this service may be easily estimated and the economic value of Galena Gear Grease appreciated.

## Galena-Signal Oil Company

New York - Franklin, Pa. - Chicago

and offices in principal cities



*There are 30 pages of helpful gear data in your G-E Railway Supply Catalog*

# Grade M

IMPROVED methods recently adopted in the manufacture of General Electric Gearing are sure to be felt in mileage records of the future. They give promise of mileage even surpassing that long associated with Grade M.

G-E metallurgists and engineers are constantly investigating processes and materials, that the supremacy of G-E Gearing may be maintained.

Let G-E railway gear specialists tell you of these recent improvements.

**The production of successful railway gearing is an art dependent on research in metallurgy, special skill in manufacture and rigid inspection and tests. G-E Railway Gearing is favored by research facilities that are unsurpassed.**

**General Electric Company**
Schenectady, N. Y.
**Sales Offices in all Large Cities**

# GENERAL ELECTRIC

New York, Saturday, December 6, 1924

# Electric Railway Journal

*Consolidation of Street Railway Journal and Electric Railway Review*
Published by McGraw-Hill Company, Inc.
HENRY W. BLAKE and HARRY L. BROWN, *Editors*

*Volume 64*
*Number 23*

## *A Background of Forty Years for Future Building*

By HARRY L. BROWN
*Editor Electric Railway Journal*

ORTY years ago last month—in November, 1884 —the first issue of the magazine that has since become the ELECTRIC RAILWAY JOURNAL made its to the youthful but vigorous street railway ustry. Then, as ever since, the paper was presenting ormation on those subjects and problems in which re was most interest on the part of the men respon- le for what was destined to become a great public vice. Those were the days when the street railway not a necessity but a convenience, and the manage- nts had to offer inducements to get the people to ride. ling transportation was then as live a topic as it come to be once more in recent years. Aside from more general aspects of the street railway business, early issues of the JOURNAL treated its technical ects, and these at the time had largely to do with ses, harness, colic cures, feed cutters, grooming chines and the like.

Even at this early date, however, improved methods operation had a prominent place in the paper. The le drive was then rapidly coming to the front to e a faster and more economical service. Electricity a motive power was frequently touched upon. While the beginning of the paper electricity was looked on rely as an experiment, it was soon visualized by the tors as the future means of propulsion for all street ways, and the paper became its active champion. neral opinion at the time, however, was in favor of cable.

Thus the whole story of the industry, its struggles successes, its mechanical development, its financial accounting difficulties, its relations with public horities, its progress in solving these many prob- s, little and big—all have been recorded for the efit of the field in the pages of this paper. It has mattered that hay motors gave way to electric tors, that rope traces gave way to gears, feed cutters rotary converters and colic cures to shop equipment; JOURNAL has kept pace. Indeed it has been a sig- cant factor in leading the way. Through these 40 rs of transition and of enormous growth in the busi- s of urban and interurban transportation, it has ored continuously in the interests of the industry. rough most discouraging days it has stuck by the ustry and steadfastly maintained that a utility so ential could not perish. It has suffered financially with the reverses in the industry, for it prospers or declines with the industry. Which is to say that the JOURNAL is part and parcel of the industry, its champion, its critic when criticism is helpful, and above all, its informant—the "bible of the industry," as is often said.

With this number, the JOURNAL commemorates its fortieth anniversary. Its history, in bare outline, is published in the following pages. Interesting as this is, it does poor justice to the history that is disclosed by going back through the 64 volumes that compose its record. To one who is intensely interested in the industry today, here is a pastime of genuine pleasure.

Going back to the very first issue, whose front cover masthead is reproduced on the second succeeding page, it is interesting to note that six pages of the total of 24, including advertisements, were devoted to news of the American Street Railway Association which had recently been organized. Thus the JOURNAL has always been an enthusiastic supporter of association activities.

From the start, the paper has featured progress and new methods—modernization. For progress is essential in an industry that not only is a direct impetus to great growth in the population of cities, but which must itself keep pace with the increasing demands upon it due to this very growth.

Think what it would mean, for example, if present-day traffic had to be handled by horse cars. The industry would have to possess more than 1,000,000 horses and mules. The Chicago Surface Lines alone would have to have some 40,000 animals. Picture the stables for housing such a herd, the small army of hostlers to take care of them, and the scores of "white wings" required on the streets. Then you take a keener interest in the discussions of the "Refined Habits of the Louisville Street Railway Mule" that found space in some of the early issues.

It is also interesting to find that the JOURNAL has treated the street railway as an essential part of a city from the very first. We find this comment in an editorial in the issue of May, 1885:

> Without this cheap and convenient system of internal transportation, working within and in co-operation with the other greater or lesser divisions of labor, the modern city could not exist. Cities of a million population now are few in number and those several cities in the near future with *five million population* would never exist except in the imagination of sanguine and false prophets,

but which by the aid of street transportation will be facts to be learned from the geography of our children.

The JOURNAL was even then building for the future. It started out with a clear vision of the great function of transportation. That vision has been realized over and over, but it has constantly expanded. Now, with the new, flexible, mobile bus as an added tool, the vision of the transportation industry of the future is again as much beyond its present scope as is the present industry beyond the horse car stage of 40 years ago.

More than of any other individual, this vision of the JOURNAL has been the reflection of the vision and genius of its publisher, James H. McGraw—a great builder of industry. The JOURNAL was his "baby"—his first publication and the beginning of the group which now are produced by the largest industrial and business paper publishing house in the world, of which he is the head. To him, clearly, is industry indebted for having set a new and substantially higher standard of editorial service in such papers. He has never spared expense nor effort to make the JOURNAL, nor any of the other McGraw-Hill publications, of the utmost possible usefulness to their industries. He sees them as among the tools of industry and as such they must be sharp and true and made of the right metal. As he said to the writer, "My whole book of instructions for you is this: 'You cannot make the paper too good to suit me.'"

It is that opportunity without limit to serve the electric railway industry to which the JOURNAL is now, even more than ever before, striving to measure up. It has a background and experience of 40 years to guide its future building. Its purpose will always be to merit the high place it holds in the estimation of the industry.

## Prosperity and the Electric Railway

FOUR weeks of a bull market in Wall Street indicate the general impression of prosperous times ahead. President Coolidge in his speech in Chicago on Thursday of this week expressed the same thought, though with a word of caution that prosperity will come only if we work for it. Secretary Mellon makes the same prediction in his annual report, published yesterday, in which he said: "The situation in America looks more favorable for sound and orderly economic development than at any time since the war."

Undoubtedly the electric railway industry should prosper in times of general good business. With general industry active, employees must be carried back and forth to their places of work, and they will have more money to spend for other travel for themselves and their families. Their purchases will be greater, and those railways hauling freight should enjoy more business. As a necessary utility for all classes of people, the gross revenue of the electric railways of the country should increase with prosperous times. At the same time railways may expect an increase in their unit costs, though the inflation of the post-war period is not to be expected, as business conditions, both in this country and abroad, are on a much sounder basis than in 1920.

Of course, the railway industry is very much better fitted to meet any increase in costs than it was in 1914 and 1915. The essential nature of the service which it renders is generally recognized, its equipment for rendering this service is of better design a much better condition than 10 years ago, and the for higher fares with increased expenses is gen recognized. A slight increase in the cost of o tion, if it comes, need not be a cause, by and for worry. But during the period now coming el railways should watch carefully their expenses a as their receipts, and if the former with careful agement rise unduly they should lose no time in ing some system of fares which will increase the m of profit.

## Modernization Builds Morale

MATERIAL improvement in the morale of the ating and maintenance employees is a certai product of real modernization work on an el railway. Its importance is perhaps as great a direct results for which modernization is under namely, economies, better patronage and better p relations. This is just beginning to be realize the properties which now have their moderniz programs well along.

The modernization work on the Eastern Mass setts Street Railway system, resulting in far b operation at lower maintenance costs, was told in this paper, page 808, Nov. 8, and discussed edito on page 830 in the issue for Nov. 15. On this pro the management has noticed a most desirable ch in the attitude of the employees. Because new e ment has replaced a large part of the old an equipment put in good condition, the maintenance think now, when a car comes in, that it is repairing. They have some respect for it. Also, a motorman takes a car out, he does so with the fe that it is a good piece of equipment, not a despi "pile of junk." He has assurance that it is goi run all day and not have to be pulled in after a hours.

It is easy to comprehend what such a feeling of fidence in and respect for the equipment, spread o property, means in the way of improved service, b public relations, more revenue and less expense.

An interesting reflection of the poor morale w results from the opposite situation on a railway observed the other day. This was on a property w one is almost afraid to ride on the cars for fear will fall down on his head and where there has been a new car or a new piece of equipment since time whereof the memory of the present generatio employees runneth not to the contrary.

A conductor came up to the front end for a with the motorman while the car awaited the t signal. He said to his teammate:

"How's she acting now?" The car had evidently pulled in that morning and was now on its first out of the carhouse again. The motorman replied:

"She's pretty good now. They put a new tip in controller."

"I'm glad to see *something* new around here," the conductor.

That remark told volumes about the condition of property and the indifferent morale of the men. virtually impossible to have good morale, a matte profound importance, on a system that has for m years not had a new car nor any evidence of kee up to date.

THE STREET RAILWAY JOURNAL

VOL. I. {NEW YORK: 32 Liberty Street.} NOVEMBER, 1884. {CHICAGO: 8 Lakeside Building.} No. 1.

**William B. Lewis.**

Street railway interests [illegible] fitted him to fulfill all the exactions of the position, in which he made an enviable Bank Department, in those years of much greater importance than at present, hence

# Forty Years of "Electric Railway Journal"

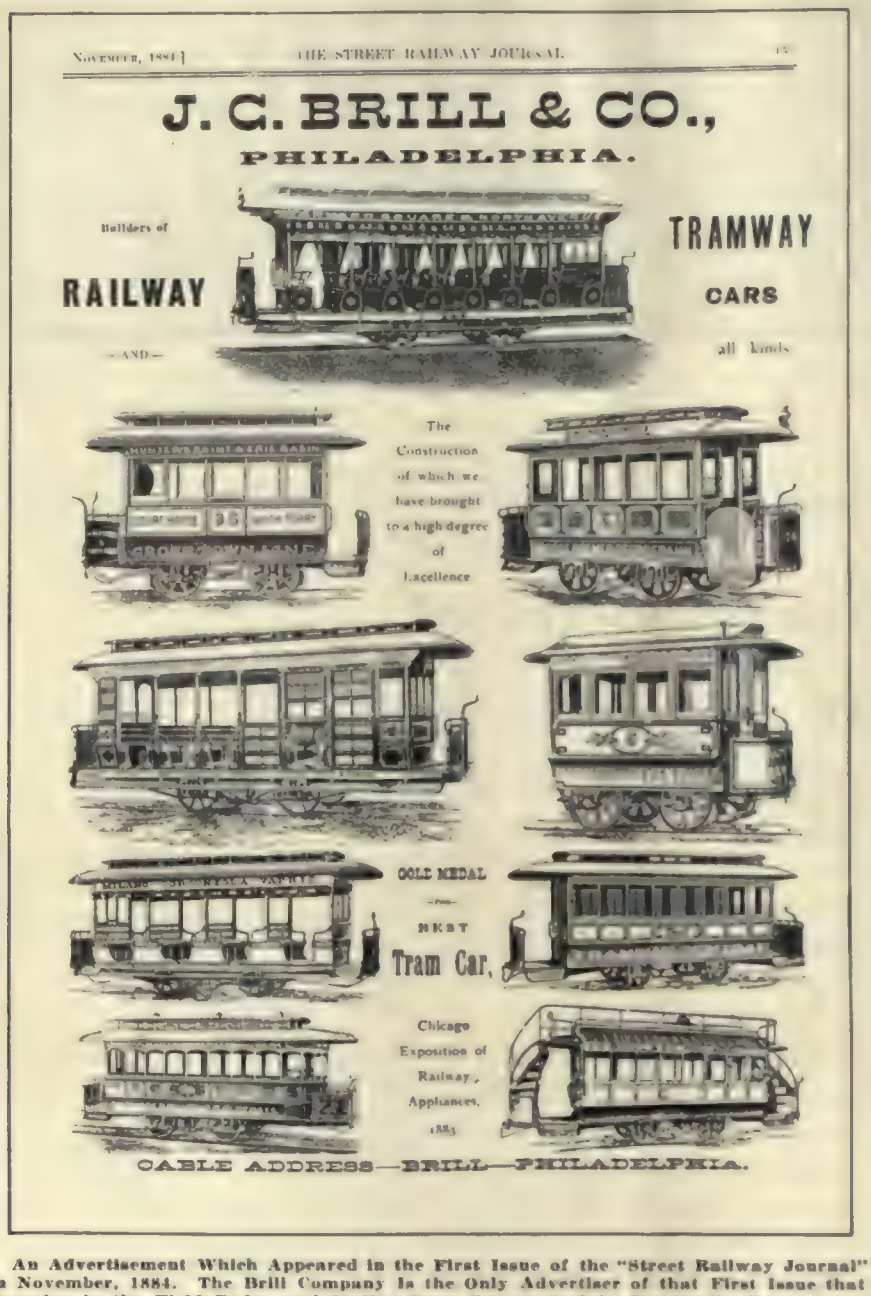
## Historical Sketch of the Beginning, Development Policies and Service Rendered by a Publication Which for Forty Years Has Been the Principal Medium for Disseminating News and Technical Information of the Street and Interurban Railways—It Has Striven to Be of Major Service to the Industry Through the Transition from Horse Car and Cable to Electric Car and Recently to Include the Bus

WITH the issues of November this paper, formerly the STREET RAILWAY JOURNAL, mpleted 40 years of publication rvice to the street railway indus-y. It was the first paper in this ld. The industry then was al-ady of sufficient magnitude that e need was felt by the men in the ld for a medium in which to ex-ange information and keep them to date on the inventions and periments which were the fore-nners of important developments on to come in the street railway dustry. There were then some 525 rse railway companies in 300 cities the United States. Their equip-ent comprised 16,000 four-wheel rs and 100,000 horses and mules. In addition there were cable rail-ays in six cities—San Francisco, icago, Cincinnati, Kansas City, ew York and Philadelphia. Al-ough the cable had been intro-ced in 1873 in San Francisco, pri-arily to provide service on the steep lls, its further use had made slow adway. This was principally on count of the excessive cost of in-allation as compared with the sim-track required for a horse railway. Electric propulsion of cars at this ne was hardly more than a dream. he idea had been conceived sev-al years before. A number of rely experimental and exhibi-on lines had been built in the period dating from 1879. The electric propulsion of cars necessarily awaited, however, on the development of electric generating machinery and of railway motors and control. In fact, looking back now, it seems fair to say that in large measure it was the electrical manufacturers who made possible the great local transportation industry of today.

The first electric street car line to be operated in regular service, that installed in Cleveland by Bentley and Knight, was 2 miles long and had three cars operating on a crude underground conduit. It made its appearance about the time of the STREET RAILWAY JOURNAL, going into service in July, 1884. Thus the JOURNAL may be said to have been born with the electric railway. The installation at Richmond, Va., by Sprague, which is usually referred to as the first practical electric road, did not come along until four years afterward. It, of course, was by far the largest installation up to that time, and more than any other proved the practicability of electricity for car propulsion. The discussions of electric operation in the early issues of the JOURNAL were thus based on the experimental installations.

The founding of the paper was also nearly contemporaneous with that of the American Street Railway Association, and in one of the early issues gave a report of the second annual convention of that association.

This, in a few words, was the extent and nature of the industry when the JOURNAL was started in November, 1884. The first conception of the paper had been the idea of Emerson P. Harris of Chautauqua County, N. Y. He had lifted a street railway department out of the *Journal of Railway Appliances*, a steam railway paper, to create the STREET RAILWAY JOURNAL as a separate monthly publication. This new paper during the first 4½ years was edited by Robert Grimshaw, George L. Fowler and Mr. Harris. It dealt mostly with horses and allied topics and the early transportation prob-




**An Advertisement Which Appeared in the First Issue of the "Street Railway Journal" in November, 1884. The Brill Company Is the Only Advertiser of that First Issue that Remains in the Field Today and It Has Been Represented in Practically Every Issue Since that Time.**

lems, with some articles and discussion on cable installations and electrical experiments.

James H. McGraw, another young man from Chautauqua County, had come with the American Railway Publishing Company, which was the publisher of the *Journal of Railway Appliances, Power* and the STREET RAILWAY JOURNAL, early in 1885. In 1889 he purchased the STREET RAILWAY JOURNAL and started his own company. Mr. McGraw then became editor and manager as well as publisher. This was about the time of the real beginning of electric operation of street railways. While with the American Railway Publishing Company Mr. McGraw had been everywhere that anything new of importance was going on in the industry. He had seen the great value of this intimate first hand contact and observation. So with the STREET RAILWAY JOURNAL as his own, he began editing the paper from the field. This has been the fixed policy of Mr. McGraw ever since all of his present great group of industrial publications.

Besides his personal editorial work Mr. McGraw developed an organization and got enough business in the paper to carry the expense and make possible this extensive traveling and field editing. C. B. Fairchild, Edward E. Higgins and Henry W. Blake were the editors whose labors contributed early toward giving the paper a standing in the field.

The JOURNAL was newsy and readable and in great demand. It was edited with self-assurance. There was a captivating spontaneity about it and an atmosphere of intimacy with the reader. The service rendered to the American Street Railway Association was invaluable. This consisted in printing notices and full and prompt reports of meetings. The names of association officers appeared in a masthead in every issue.

The first issue contained more than six pages of convention reports. Of its 24 pages, four were occupied with editorials, personals, letters and fillers. Nearly 13 pages of advertising completed the contents. The first page was occupied with an obituary notice, illustrated with a wood cut of William B. Lewis, who had been president of the Brooklyn City Railroad, which incidentally has the same corporate identity today as then.

In these early issues the name of C. J. Van Depoele was much in evidence, as his company was very active at the time in making installations of electric railways. John Stephenson, the veteran car builder, wrote on the evolution of the street car in which he had played an important part. Bentley and Knight, whose names are linked with pioneer electric railway work, figured prominently. The opportunity to reach the street railway field through the widely circulated paper was appreciated by Sidney H. Short, Frank J. Sprague, Elihu Thomson, E. J. Houston, J. C. Henry and many others. These men were prolific of ideas regarding the electric motor and its application. Their comments and the articles regarding their inventions made reading of intense interest to street railway men.

Mr. Fairchild, upon becoming editor of the paper, began visiting street railway properties, spending enough time on each really to become acquainted with its problems and its equipment. His researches were promptly reflected in the paper which showed clearly that it was being edited from the field.

One of his first ventures was a series of talks with electric railway men, in which he used the dialogue form of reporting. He began in July, 1889, with C. D. Wyman, vice president Central Park, North & East River Railroad. The "talks" made a big hit and were continued for some time. Mr. Fairchild wrote

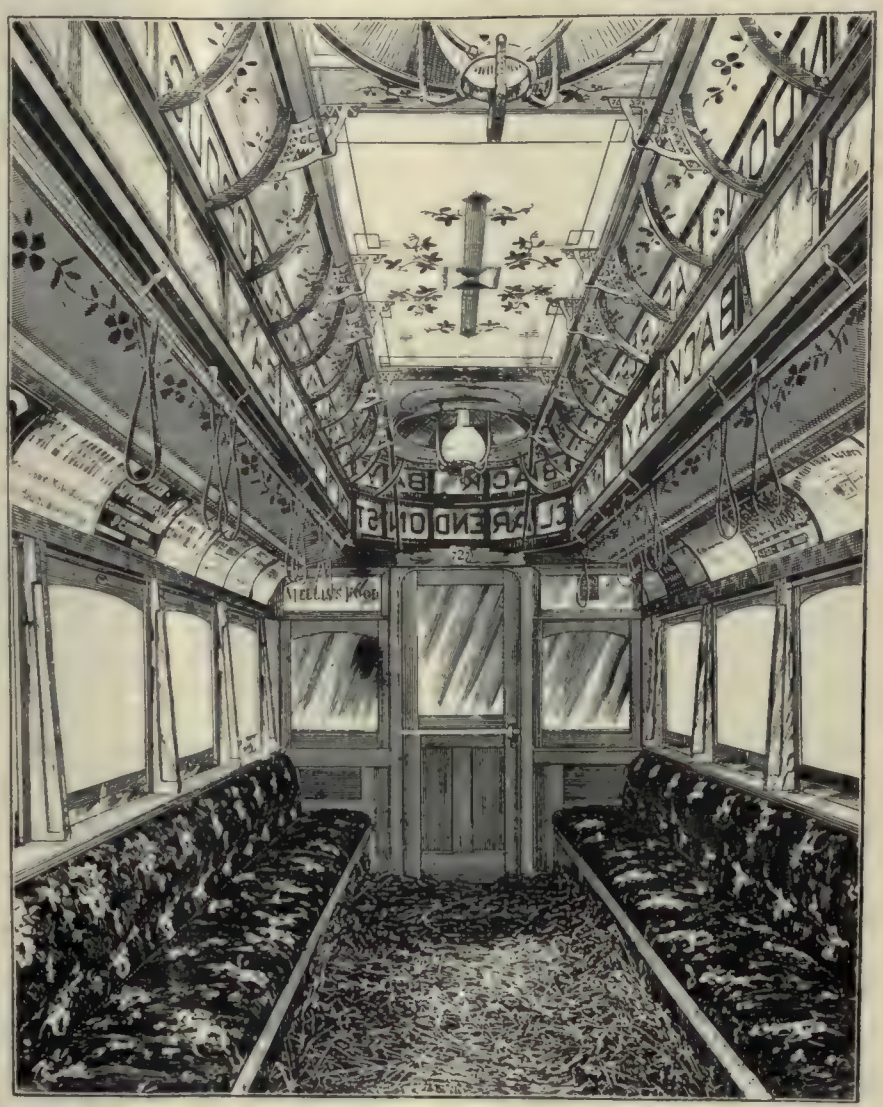
from the field fully illustrated descriptions of electric railway conditions in many important cities. These studies were unique and their thoroughness commended them. They were voluminous but easy to read and were of great service to the industry. During 1893 and 1894 all but four states in the country were visited and their railways studied in detail.

Mr. Fairchild had not been traveling long among street railway properties before he discovered a need for some kind of a systematic textbook in this field. The scattered railways needed a foundation of information as to best practice if they were to progress without making costly mistakes. He undertook to furnish it. He began in the JOURNAL in 1890 a series of copyrighted articles on street railway practice, later published in book form with the title: "Street Railways; Their Construction, Operation and Maintenance." As one of the earliest books on practical electric railway construction and operation, this proved to be a splendid piece of work which was widely read and highly appreciated by the industry.

Mr. Fairchild's principal contribution to the paper during his 6-year connection with it was that he brought it into personal contact with the leaders of the industry. These 6 years comprised the period of most rapid electrification of the horse, steam and cable street railways. He watched this process not at long range from the office, but on the ground. Although not a railway man by training he was able to sense the problems that confronted the men who were doing pioneer work in transportation.

It was in 1891 that the first "Souvenir" issue of the JOURNAL appeared. This was a supplement to the paper, issued in advance of the A.S.R.A. convention. Its purpose was to prepare the way for the convention.

As to editorial contents, the main feature of the "Souvenir" was a group of articles regarding the convention locality, each of the many railways in Pittsburgh and Allegheny being covered. This practice has since been followed in what later were designated as "Convention Issues" rather than "Souvenirs," whenever the convention has been held elsewhere than at a pleasure resort. There was also a history covering the 9 years of the association, articles regarding leading manufacturers, a list of exhibitors containing 117 names, and a membership list of the association.



An Elaborate Wood Cut from the Cover of the Street Railway Journal of June, 1886. It Shows the Interior of a New Car of the Metropolitan Railroad, Boston. The Cut Was Used in Subsequent Issues in an Advertisement of the United States Steam and Street Railway Advertising Company, Ltd.

### MR. BLAKE JOINS THE STAFF

When Henry W. Blake came with the JOURNAL in January, 1891, as assistant to Mr. Fairchild, he added an element to the organization that it had not had before. He had had unusual educational advantages. He had graduated from the Sheffield Scientific School of Yale University in 1886, in civil engineering, and had followed his Yale course with one in electrical engineering at the Massachusetts Institute of Technology, finishing it in 1888.

After graduation, Mr. Blake had been connected with the Sprague Electric Railway & Motor Company, for which he handled advertising and publicity. This work naturally brought him into contact with the trade press of that day, and he became acquainted with Mr. McGraw.

Mr. Blake co-operated heartily with Mr. Fairchild in the endeavor to make the paper practical. He was the natural successor of Mr. Fairchild when the latter left the paper in 1894.

## Studies in Electric Railway Economics

BY 1893 the STREET RAILWAY JOURNAL was so firmly established and had made so creditable a record for itself that it was ambitious to render even greater service to the industry than it had done theretofore. The opportunity developed through the appearance on the scene of Edward E. Higgins, who after some 7 years experience

with several manufacturing companies traveled extensively abroad. On returning home he opened a consulting engineering office, but soon after, in 1893, joined the staff of the JOURNAL as co-editor.

He had already begun the preparation of a series of articles on street railway investments. These were published in the JOURNAL, beginning in the January, 1894, issue. They were a notable contribution to a new subject and attracted wide attention. Later, these articles were published in book form.

While the articles were coming out, the preparation of a financial manual was also under way. It first appeared in June, 1894, as a supplement to the JOURNAL. At first it carried the title "American Street Railway Investments," but it later became the "McGraw Electric Railway Manual." The supplement was bound in cloth of a brilliant red color, from which it soon became known as the "Red Book," a nickname which continued through its 21 years of existence.

The "Red Book" contained much financial information that was not available elsewhere, even including subdivided operating data when such were available. In the first issue there were reports of more than 1,000 railways operating in about 600 cities and towns.

The consolidations that were going on as horse car lines were bought up extended their range and made the financing less and less a matter of local concern. Large sums of money were needed and it became necessary to go to outside investors for funds. This naturally made a field for the "Red Book," which stepped in to help sell the idea of the electric railway as a desirable investment field.

Mr. Higgins continued as co-editor of the JOURNAL until 1900, when he retired to enter the general publishing field. He was with the paper during the period when his expert knowledge was most needed, that is, during the constructive, speculative period of the business.

The "Red Book" which he started was continued after he left the JOURNAL, as long as there appeared to be a field for it. It was discontinued with the volume for 1914.

## Real Newspaper Service Started

AS FAR as the style of the contents went the STREET RAILWAY JOURNAL was newsy from the start. It went as far as a monthly publication could go in furnishing news, but in its first decade there was not the pressure upon it for prompt news service that came about in the middle '90s. By this period the street railway business was booming. The incorporation of new companies was of frequent occurrence, and enormous quantities of supplies were being purchased. So the JOURNAL publishers felt it incumbent upon them to provide news service of a more comprehensive nature.

The first step was the issuing of a daily business news bulletin for the benefit of advertisers and prospective advertisers. This put the facts promptly before those who could most immediately benefit from knowing them. Information for the news bulletin was secured from local correspondents, by the editors, etc. The more permanent items of news used in the bulletin were salvaged for insertion in the regular issues of the JOURNAL.

Experience with the news bulletin, and the desire of the publishers to improve the news service furnished to all subscribers, led, in June, 1899, to the issuing of a weekly supplement, devoted entirely to news. This was continued to the end of the year, when it was incorporated with the paper as a regular feature. With the issue of Jan. 6, 1900, the STREET RAILWAY JOURNAL became a regular weekly.




Another Type of Motive Power Advertised in the Issue of January, 1886

During the first month the first issue of the paper contained 66 text pages and the others 12 each, but gradually the news issues increased in size and finally all issues became uniform. The news section, however, was printed in a definite place in the paper, thus continuing in a way the identity of the news issue.

### SPECIAL ATTENTION GIVEN TO FOREIGN PRACTICE

While during its first decade the STREET RAILWAY JOURNAL was growing in influence among the street railways of the United States and Canada, it also increased in prestige abroad. The practical application of electricity as a propelling power for street railways in Europe lagged somewhat behind that in this country. Although Siemens & Halske had demonstrated that electric cars were practical as early as 1879, it was not until 1894 and 1895 that really active European tramway development took place. In the meantime the phenomenal success of the electric railway in this country was creating abroad a demand for American apparatus, and large quantities were exported.

The JOURNAL had a considerable share in keeping Europe informed as to what America was doing along this line. It was natural, therefore, that the office of the paper was frequently visited by representatives or delegations from Great Britain and the Continent who had been sent here to study American practice. This brought the editors into close touch with foreign developments. Furthermore, the paper had competent foreign correspondents and early established a London office in charge of A. W. Shaw, who served as European manager until 1917.

Messrs. McGraw, Higgins and Blake had traveled extensively in Europe. They were quick to see the desirability of publishing a special European edition which would increase the already large foreign subscription list and render the advertising more fruitful. Such an edition, started in 1897, was a modification of the American edition, some parts of the latter being lifted out and a section dealing with foreign practice being inserted.

The body of the paper was all in English, but to assist the foreign subscribers quickly to gain a comprehensive idea of the contents of an issue, digests of the principal articles were printed in French, German and Spanish. The digest facilitated the use of the paper, as a person familiar with one of the foreign languages was able with its aid to determine whether it was necessary for him to dig into the original article. References to figure numbers in the articles were given in the digest, thus virtually illustrating it.

The foreign edition with the digest was continued for several years, until the increasing familiarity of the JOURNAL'S foreign readers with English rendered it no longer necessary.

# Journal Becomes More Technical

THAT the STREET RAILWAY JOURNAL was keeping in close contact with its rapidly developing industry was indicated by the increasingly technical, although always practical, nature of many of its articles. From 1895 onward, for, say, 15 years, the progress of electric railways was mainly along engineering lines. Power plants and power transmission, track design and construction, scientific application of motors, and heavy electric traction were features of transportation work which had attracted engineers. The JOURNAL became largely an engineering paper for a time.

An excellent illustration of the work of the paper along engineering lines is furnished by the campaign on train-resistance formulas. Obviously it was essential to designers to know what resistance a car or train would have to overcome at various speeds.

The JOURNAL started with a formula determined by John Lundie, a consulting engineer who had had much to do with the elevated railways in Chicago. The Lundie formula soon became famous through the publicity thus given to it. Experts like C. O. Mailloux, W. H. Blood, Jr., and others brought out the results of their work through the JOURNAL almost as a matter of course. Within 10 years its columns became the repository of most of the writings on the subject, and the paper was widely quoted. All of the early literature on train resistance refers to the JOURNAL as the source of much original information.

The height of the train resistance formula campaign came about 1902, when the soundness of some of the conclusions of the paper were attacked. Mr. Blake was abroad that year and was present at the office of the Siemens-Halske Electric Company in Berlin just as the proof sheets of the report on the famous Zossen high-speed railway tests came in. He was permitted to send some summary sheets to New York for publication long in advance of other publicity. The Zossen results vindicated the JOURNAL'S reasoning and the conclusions were driven home by a series of editorials.

When in 1904 the Electric Railway Test Commission was organized in connection with the Louisiana Purchase Exposition, to utilize the facilities of the exposition for scientific investigation, Mr. McGraw was invited to become one of the five members in recognition of the work which his paper had done in encouraging the laying of a sound engineering basis for railway work.*

The Test Commission produced an elaborate and valuable report which many were anxious to have published in book form. As no one else would finance the printing, Mr. McGraw agreed to do so because he said it had to be made available to the industry.

The JOURNAL also did an important work for the industry along power plant lines beginning back in the early '90s. The rapid expansion of the electric railway business created an enormous market for power-plant machinery, because the railways required power on a large scale and required it at once. Power was not available from lighting plants in the necessary quantities, and of the proper variety for railway use, so that each railway, no matter how small, had to have its own plant. Beginning in 1891 or earlier, articles on power plants and power plant practices became conspicuous. In 1897 the paper secured from a well-known engineer, Dr. Charles E. Emery, a notable series of articles on engines for electric railway power plants. This began in the "Souvenir" issue of that year and continued into the following year. The articles formed a veritable treatise on the subject and were of great value to the industry.

As each important power plant was built for an electric railway property, it was described fully in the paper in order to illustrate the technical advances. From time to time articles of a more general nature were published, including many editorials on all phases of power development.

This continued until, in recent years, electric railways have tended more and more to purchase power from central stations. To secure operating economy, large power plants and super-power plants have been developed to generate electric power on a large scale, distributing it to all classes of customers. The electric railway makes an excellent customer for such a plant, and in many cases can buy power cheaper than generate it. This situation has naturally been reflected in the pages of the JOURNAL, which, of late years, have contained proportionately much less material on this subject.

*James G. White was chairman of this commission; H. H. Vreeland, treasurer; Mr. McGraw, secretary; the other members were George F. McCullough and W. J. Wilgus.

### ACTIVE INTEREST TAKEN IN ELECTRIFICATION

About the time that train resistance had become reasonably well understood, it happened that the electrification of steam railroads began to attract attention. The JOURNAL fortunately was in a position to be of great assistance in this development. The task of disseminating information on heavy traction fell naturally upon the paper because most of the pioneer work in this line was done by men trained in electric railway work.

The application of electric motive power in hauling heavy trains began, in this country, with the electrification of the Baltimore & Ohio Railroad tunnel in Baltimore in 1894, but it was nearly 10 years thereafter before railroad managers became seriously interested. Even then the railroads were very slow to recognize the electric locomotive as a coming thing, and made installations only as necessitated by tunnel conditions. In the meantime the JOURNAL kept hammering away, editorially and by the best of technical news service, to convince transportation men that there was a field for electric operation of trains. That this work was thoroughly done was indicated by the extended use of the paper for reference on this subject. A recent French work on electrification in the United States, as well as American bibliographies on the subject, are replete with references to the paper. From the beginning all important installations have been fully covered and their significant features have been pointed out.

### CAMPAIGN FOR PUBLICITY

While, with the industry, the JOURNAL was becoming more technical, the publishers and editors of the paper did not confine themselves to engineering. One thing they early recognized was the need for publicity of electric railway affairs if good public relations were to be preserved. The JOURNAL took a leading position in this matter, far ahead of that occupied by railway managers generally. Editorially and in news articles it preached the gospel of frankness in dealing with the public. Progress was slow, but in time results began to come, especially as public service commissions increasingly required full information to be filed. Now, of course, publicity is accepted as the normal thing.

In May, 1908, Mr. McGraw purchased from Hugh M. Wilson the only serious competitor of the STREET RAILWAY JOURNAL, the *Electric Railway Review*. With the first issue of June the two papers were combined as the ELECTRIC RAILWAY JOURNAL.

At the time of the consolidation of the JOURNAL and the *Review* the latter was in its eighteenth year. The paper was started in Chicago in 1891 as the *Street Railway Review* by H. H. Windsor, with whom was associated Fred S. Kenfield, Western advertising manager of the STREET RAILWAY JOURNAL. Ten years after the *Review* was started Mr. Windsor sold his interest in the paper to his partner, who organized the Kenfield Publishing Company. Mr. Kenfield in turn sold the property in 1906 to Mr. Wilson, publisher of the *Railway Age*, and left the publishing business.

The *Review* was improved in every way by Mr. Wilson and became an active competitor of the JOURNAL.

When the JOURNAL absorbed the *Review* its staff experienced a welcome increase. In addition the JOURNAL gained several editorial features, including the daily edition issued in connection with the annual convention of the Electric Railway Association and the annual statistical issue.

## The Dictionary and the Directory

A FEW months before the JOURNAL took over the *Review* in 1908, Jan. 1 of that year to be exact, the paper had engaged as associate editor, Rodney Hitt, who for nearly 6 years had been connected with the *Railroad Gazette* and who had had valuable experience in compiling and revising several of the railway dictionaries which the Boardman Publishing Company issued in co-operation with committees of the steam railroad associations. Plans were soon laid to publish a similar dictionary for electric railways in co-operation with the American Street and Interurban Railway Association.

As an advisory committee on the proposed dictionary, the association appointed H. H. Adams, New York City; Paul Winsor, Boston, and Richard McCulloch, St. Louis.

The preparation of the dictionary went along steadily during the ensuing two years, and it was completed during 1911.

The book comprised 355 pages, of which 63 contained definitions to the number of 2,200. The remainder was made up of illustrations—pictures and drawings of cars and parts of cars, with details of equipment. As stated by the committee, the primary purpose of the dictionary was to assist in bringing about standardization of the terms used electric car building and maintenance. It was an outstanding service of the McGraw Publishing Company to the industry.

The present publication of electric railway directory was outgrowth of early work done the paper. It dates back to Ju 1885, for in the issue of the STRE RAILWAY JOURNAL for that mon appears an official list of street r ways of the United States and C ada. It continued to be print monthly until June, 1892, aft which it appeared only quarterly a period of 5 years. By 1897 directory had grown so that it printed separately in the form o booklet about 4 in. x 6 in. in size, a supplement to the paper. This gan the second stage of its devel ment. The booklet was not cir lated generally, but was print mainly for advertisers. For e railway it gave the officers, tra mileage, and numbers of motor a trail cars. There was no advert ing in it. Beginning with the is for February, 1904, the direct became essentially the McGraw El tric Railway Directory of today, w a page size of 4 in. x 8½ in.

## The Journal from 1908 On

SINCE 1908 the most conspicuous single addition to the service rendered by the paper has been the improvement in the field of maintenance. The editors realized that the subject of maintenance had become so important in the eyes of the electric railway operator that they should give it more intense treatment. Consequently, a special ma tenance number, the first of annual series which has continu until the present time, was issu April 4, 1908. In 1913 the numb and range of the articles on main nance were increased and segregat in a special department.

This equipment and maintenan section was well received in the fie It resulted in the further develo ment of the maintenance service, devoting an entire issue each mon to mechanical and engineering m ters, except for the timely ne material which always has the rig of way. Such a plan was start with the issue of February 23, 19 The regular weekly equipment a maintenance department was om ted. Later, the weekly departme was restored, supplementing for t weekly subscribers the servi furnished by the monthly.



**Motor Maintenance and Storage in 1884**
Reproduction of a wood cut in one of the early issues of the STREET RAILWAY JOURNAL

### INTEREST IN BUS MATERIALIZES

The JOURNAL early foresaw th electric railway managers should well informed on motor bus develo ments. It published articles on t place of the bus and advocated

proper co-ordination of bus and rail service. The paper was in a difficult situation because for the ultimate good of the electric railway industry it had to take an advanced position. The electric railway industry had suffered so keenly from jitney competition that it was in no mood to discuss the subject and in general resented the suggestion that electric railways should operate buses. The paper urged that, as transportation experts, the railways should control a complete co-ordinated system. But not all railway managers believed that buses could be operated at a profit and they hesitated to go into the business. They did not like to see their favorite paper advocating what seemed to them to be a suicidal policy. Yet it was clear to the JOURNAL editors that a great service could be done both the electric railways and the independent bus operators by showing the proper field of the bus and by preaching the principle of helpful co-ordination rather than destructive competition.

The logical answer could only be a separate paper with a bus appeal, which would reach both the bus operator and the electric railway interested in bus operation. Such a paper, named *Bus Transportation*, was started in January, 1922.

Harold V. Bozell, then co-editor of the JOURNAL was appointed editor of the new paper as well, and Carl W. Stocks, managing editor. Mr. Stocks became its editor on July 1, 1922, when Mr. Bozell was transferred to the *Electrical World*.

The starting of a bus paper by the McGraw-Hill company was considered by electric railway men generally as a wise move. The opinion was not unanimous, however. Without waiting to see how the publishing plan would be worked out, one of the state electric railway associations voiced extreme opposition in a formal resolution.

The JOURNAL continued its plan of treating the bus and opposition to the new venture soon died down. In due course the electric railways began to show a genuine interest in the bus, as was well illustrated at the 1923 and 1924 conventions of the American Electric Railway Association, where bus exhibits were the most conspicuous feature. In fact, several of the railways which objected to the publication of *Bus Transportation* are large users of buses today.

The depression in the industry resulting from the high costs attendant upon the war reacted unfavorably upon the JOURNAL from the business standpoint. Many advertisers stuck by faithfully, even when business was dullest, but the mounting costs of production had the same effect on publishing as on electric railway operation. Retrenchment was necessary, but even though the paper was losing money, the essential editorial service was maintained.




**The First Advertisement of Any Electric Railway Equipment to Appear in the Paper. This Was in the Issue of December, 1885.**

### SOME CHANGES IN THE STAFF

As Mr. Blake approached the end of a thirty-year period of service, with the JOURNAL, he appreciated the fact that he should have associated with him a younger man of the executive type of mind and trained to relieve him of details. Accordingly, Harold V. Bozell, in February, 1920, became associate editor of the paper. He was promoted to the position of co-editor with Mr. Blake a few months later, but in July, 1922, was transferred to the *Electrical World*, becoming co-editor of that paper with W. H. Onken, Jr.

When Mr. Bozell was transferred to the *Electrical World*, Harry L. Brown, who since 1915 had been first Western editorial representative, then associate editor and later Western editor, with headquarters in Chicago, except for 20 months of military service, was transferred to New York as managing editor. On Jan. 1, 1923, he was appointed co-editor with Mr. Blake and placed in executive charge.

During 1923 the editorial staff was increased with a view to rendering a more practical service to the industry. To permit this, three new men were secured from electric railway properties, Messrs. Charles Gordon, J. A. Miller, Jr., and M. B. Knox, and one from a consulting engineering practice, Morris Buck. G. J. MacMurray and C. W. Squier, in addition to Mr. Blake, also members of the present staff, had been with the paper for a number of years.

As executive editor, Mr. Brown believed that the electric railway industry, with returning prosperity could and would support this more comprehensive editorial service. Mr. McGraw was willing to back him up. The field has responded; the paper has won increased recognition, and the revenue from advertising has grown so that this standard of service can be maintained and improved upon in the future.

# "Souvenirs" a Series of Text Books

THE story of the ELECTRIC RAILWAY JOURNAL would not be complete without further reference to the annual which has been published since 1891 just prior to the convention of the American Street Railway Association, later the American Street and Interurban Railway Association, and still later the American Electric Railway Association. The purpose of this publication at the outset was to acquaint the members of the association with the local street railway situation in the convention center, and to give them full information regarding the association officers and their activities.

The annual was distributed long enough in advance of the convention to permit those who expected to attend it to receive their copies before starting, and thus prepare them to make the most of their opportunities. Those who remained at home benefited also, through being furnished with unusually complete information regarding railway conditions in a particular section of the country.

The annual was at first known as the "Souvenir," and it was issued as a supplement to the paper. It was printed on stock of finer quality than the regular issues and no expense was spared on illustrations and text preparations. Later, the "Souvenir" became a section of a regular issue, printed and bound separately, but paged so as to bind in its proper place in the volume. Still later, as at present, one of the regular issues was enlarged to accommodate the articles appropriate to the occasion, the enlarged issue being known as the Convention Number.

In 1907 the electric railway association began the practice of holding most of its meetings at Atlantic City, N. J., thus obviating the necessity for the kind of a program which the Convention Issue had provided for 16 years. The plan was changed, therefore, for issues of Atlantic City convention years, at least, to one under which a review was given of the progress made in the art along some lines particularly active at the time. Examples are heavy traction, welfare work, interurban practice, one-man cars, and public relations. The table published herewith gives the full list of subjects.

## The Convention Numbers of Electric Railway Journal

| Year | Convention City | Contents of Convention Number |
|---|---|---|
| 1891 | Pittsburgh | History of American Street Railway Association — Articles regarding Pittsburgh and Allegheny railways — Articles about manufacturers — List of exhibitors (117) — Membership list of association. |
| 1892 | Cleveland | Articles regarding the association and the convention program — Biographies of local committee members — Descriptions of local railways — Manufacturers' section. |
| 1893 | Milwaukee | Extended articles on several local railway systems. |
| 1894 | Atlanta | Tenth anniversary. Elaborate article on Atlanta — Biographical notes of American Street Railway Association officers and committee members — History of the STREET RAILWAY JOURNAL — Other articles — Totaling 122 pages of text. |
| 1895 | Montreal | Electric railway systems of Canada — Long illustrated article on the American Street Railway Association. |
| 1896 | St. Louis | Signed articles by experts covering different aspects of local street railways — Statistical study of great street railway properties of America — Progress of the year — Section on new appliances and engineering development. |
| 1897 | Niagara Falls | Articles on electric railways of Niagara region — First article of a series by Dr. C. E. Emery on engines for electric railway power stations — Large number of short articles, some signed. |
| 1898 | Boston | Articles regarding the local situation and numerous general articles. |
| 1899 | Chicago | In addition to articles on local railway situation, electric railway practice in several foreign countries was covered. |
| 1900 | Kansas City | International engineering — Besides space given to local situation and to convention, the issue covered railway practices in several foreign countries and included high grade technical articles such as design of large railway generators, by H. F. Parshall; electric railway motors by John Lundie, etc. |
| 1901 | New York | More study of local transit situation in all phases, remarkably complete. The leading article was written by Frank R. Ford and contained, so far as is known, the first diagrams ever published, showing the location of cars on a street railway system. |
| 1902 | Detroit | Besides featuring the local situation, authoritative articles were given on interurban traction covering many roads. Notable article by Philip Dawson on suburban transportation conditions of London. |
| 1903 | Saratoga | While local situation was covered, principal contents were general articles on track, overhead, rolling stock, power equipment, and repair shop methods. |
| 1904 | St. Louis | Twentieth anniversary. Besides the local situation, history of the American Street Railway Association was given and the evolution of the industry was covered in a series of articles. Achievements in detail were given year by year and statistics presented in graphical form. There were notable articles on the New York subway, its power plant and distributing system. |
| 1905 | Philadelphia | Comprehensive study of Philadelphia street railway systems. New make-up adopted with text and line cuts on rough paper, halftones on coated paper in sections—commercial type face employed. This issue contained the first maps of a street railway published in this country, so far as is known, showing by the width of the lines the normal number of cars passing over that line within a definite peri d. |
| 1906 | Columbus | In addition to articles on the Columbus street railways and neighboring interurban railways, there were excellent articles on rolling stock, generation and distribution of power, carhouses, schedules, freight and express, interurban economics, etc. |
| 1907 | Atlantic City | First Atlantic City convention — Railroad electrification issue — All phases of electrification, including maintenance were taken up — There was a feature article by Philip Dawson on electrical equipment of main line railways in Europe. |
| 1908 | Atlantic City | Operating practice — Articles dealt with employment of trainmen, welfare work, train dispatching, tickets and fares, track, overhead, carhouses, repair shops, etc. |
| 1909 | Denver | Twenty-fifth anniversary — Tramway situation in Denver covered, as well as interurban railway construction and practice in the West — History of preceding five years covered year by year |
| 1910 | Atlantic City | Development of traffic — Articles took up promotion methods in different parts of the country — As illustrations had to be scattered through text, coated paper was used throughout — It was lightly tinted in green |
| 1911 | Atlantic City | The Public Service Railway system was exhaustively covered in all departments |
| 1912 | Chicago | An elaborate study of the Chicago properties, going into many phases of their construction and operation |
| 1913 | Atlantic City | Recent progress — The topics thoroughly covered were track construction, power generation, car design, repair shop methods, fare accounting, freight handling, signals and self-propelled cars. |
| 1914 | Atlantic City | Public relations — Articles, a number contributed, on three phases of subjects: Meeting the public, operating conditions, and regulation |
| 1915 | San Francisco | Pacific Coast properties — Signed articles relating to various electric railway matters. |
| 1916 | Atlantic City | The development of electric railway cars was treated from different points of view. |
| 1917 | New York (Conference but no convention this year) | More service at less cost — This issue was devoted to the development of one-man car operation |
| 1918 | New York (Conference but no convention this year) | Issue devoted to four subjects as follows: What war has meant to Canada's lines; How safety cars save fuel and men; British tramways severely affected by war; Disabled soldiers in electric railway service |
| 1919 | Atlantic City | Selling transportation — Means for getting electric railways on a profitable basis, including several articles on the zone system. This was the year of the printers' strike, but the Convention Issue was out just in time to avoid it. The convention report number had to be published in Baltimore. |
| 1920 | Atlantic City | Mass transportation — Signed articles by experts on several phases of the problem of handling passengers in large groups. |
| 1921 | Atlantic City | Better salesmanship in transportation — The articles show how all departments can help in the sale of transportation, there being articles signed by several experts. |
| 1922 | Chicago | Chicago transportation experience — All phases of this subject were discussed by experts in signed articles. |
| 1923 | Atlantic City | Trends in car development — An analytical study of the different phases of car design tendencies |
| 1924 | Atlantic City | Modernization — A group of signed articles on the introduction of modern methods into the work of every department of the electric railway, contributed by outstanding men of the industry. |



The North Lexington Carhouse Has Been Converted Into a Bus Garage

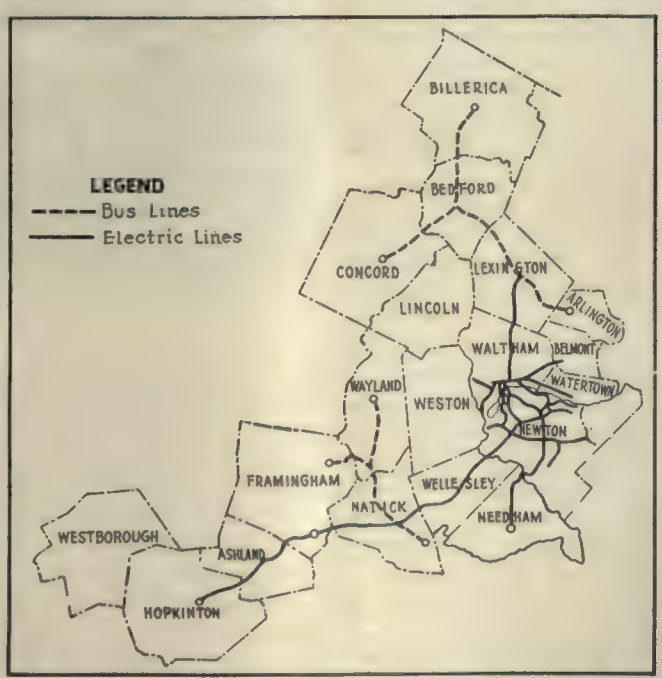
# Buses Run Along Paul Revere's Route

**Historic Towns in Eastern Massachusetts Formerly Served by Single-Track Lines of the Middlesex & Boston Street Railway Now Have Bus Service Operated by the Same Company—More Economical Operation Has Been Obtained on Routes Where the Traffic Is Light**

LARGE areas in one of the oldest sections of the United States have recently been provided with modern bus service in place of street car service. In spite of its age, however, this district is one which has never been closely built up and the passenger traffic on the railway has always been comparatively light. When it became necessary some time ago to consider the problem of rebuilding several miles of its track, the Middlesex & Boston Street Railway, Newtonville, Mass., determined that under these traffic conditions it would be more economical to undertake bus operation. This has been done with the result that operating costs have been materially reduced without affecting the revenue at all.

The more important of two such routes recently established by the railway begins at Arlington Heights, where connection is made with the Boston Elevated Railway, and runs in a general northerly direction through Lexington and Bedford to Concord and Billerica. These towns are all in Middlesex County and the bus line in part follows the famous route taken by Paul Revere in 1775 when he rode to "spread the alarm through every Middlesex village and farm."

The new bus route follows the old car route from Arlington Heights through Lexington and Bedford. From the latter town one branch goes to Billerica and another to Concord as did the railway. From Billerica to Arlington is 13 miles and from Concord to Bedford is 4 miles, making the total trackage on which car service has been suspended in the last few months about 17 miles.




Routes on Which Bus Service Has Replaced Car Service in a Historic Section of Massachusetts

Formerly, a two-hour street car headway was run from Billerica to Arlington, and a similar two-hour headway from Concord. This gave hourly service between the junction at Bedford and the Arlington terminus. Short trips going only as far as the Bedford town line reduced the headway to a half hour through Lexington. For the most part buses are now operated on the same headway as the cars formerly had, except that on account of the small carrying capacity of the bus as compared with the street car some trips have

been "doubleheaded." It is expected, however, that next summer it will be necessary to increase the bus mileage considerably to take care of the heavier riding at that time of year.

The running time is the same as before, except that schedules are better maintained on account of having no turn-out delays. From Arlington to Concord or Billerica the round-trip time is 2 hours, which corresponds with the headway. One bus therefore suffices for each of these services. From the Bedford line to



Where Bus and Car Lines of the Middlesex & Boston Street Railway Connect at Lexington

Arlington two more buses are used to supply the half-hour headway required between these points. These four buses are run all day. During rush hours, however, extra trips are run from the center of Lexington, providing a 15-minute headway between there and Arlington. In this area standing loads are permitted.

The last car was operated on this route on Sept. 15, 1924, and since that time the traffic has been handled entirely by bus. So far there has been no notable increase or decrease in the number of passengers carried. Fares are the same with the buses as they used to be with the cars. There are three 10-cent zones between Arlington and Billerica and the same number on the branch running to Concord. No fare box is used. Fare is handed directly to the operator when the passenger enters the bus, and its receipt is recorded on an International cash and ticket register. At the end of each fare zone the operator stops the bus and goes through to collect second or third fares. This method of collection is feasible because the second and third fare points are far out in the country and the number of bus passengers is small. Free transfers are issued at Lexington between the railway's cars and buses.

When bus operation was undertaken in this district the North Lexington carhouse of the railway was converted into a garage. The cars which continue to operate in Lexington were transferred to the Waltham division, and are now housed at, and operated from, that carhouse. For greater convenience the swinging doors of the carhouse at Lexington were converted into sliding doors of smaller dimensions, as large entrances were no longer needed. The pits in the carhouse were filled in and the necessary changes made in the tool equipment to permit the repair of the motor vehicles. It is planned in the future to concrete the floor of the carhouse, but this has not yet been done. A gasoline filling station is located in front of this building.

The new automotive equipment of the Middlesex & Boston Street Railway consists of 12 White Model 50-A buses with Bender bodies. Of these seven are at Lexington and five at Natick. Slight modifications have been made in the design of two of the most recently purchased in order to give more knee room for the seated passengers, and to provide additional space for standing passengers. This change has increased the over-all length about 7 in. An interesting feature of the design is a rear bumper which has been put on to prevent damage to the body if the operator backs into a tree, pole or other obstruction.

The four all-day buses operated from the North Lexington garage and three trippers cover altogether about 800 miles per day. Each bus is inspected daily at any convenient time when not needed for service. An experienced auto mechanic who formerly was connected with the White Motor Company in Boston has been engaged to supervise bus maintenance for the railway. The fact that the White company maintains a large and well-equipped service station in Boston has been helpful in reducing the amount of repairs which it is necessary for the railway to take care of in its own shop.

Various kinds of tires have been tried to determine which is best suited to the particular conditions of operation. All tires are bought outright, however, and no tire supply contracts arranged on a mileage basis have been made. The railway expects that each tire will give at least 12,000 miles service.

As October, 1924, was the first full month of bus operation, the management feels that it is too soon to draw definite conclusions regarding the financial success of the experiment. The cost of operation has not yet been accurately determined, but the railway believes that the final figure will be between 25 cents and 30 cents per bus-mile. Even if the cost should reach the maximum believed likely, that is to say about 30 cents per bus-mile, it will be less than the previous cost of railway operation per car-mile. Moreover, it will also be lower than the present revenue per bus-mile, which is, as already mentioned, approximately the same as the old revenue per car-mile.

Among the advantages resulting from the substitution of buses for cars in this instance were the release of track and line maintenance gangs formerly required for the Lexington division and a reduction in the supervisory force at the carhouse. No power need now be purchased from the Edison Electric Company, as the car line which has continued to operate in Lexington can be supplied with power over the railway's own feeders from other stations. Some of the cars which were released when bus operation was inaugurated have been placed in service elsewhere. Others, however, were considered too old and too heavy to be used any longer, and these were scrapped. Accidents have been fewer with the buses than they were previously with the cars.



One of the Extra-Length White Buses on the Road from Lexington to Concord

protect itself in this respect the railway carries ility insurance.

n so far as possible the trainmen who formerly rated cars in this division have been retained by the pany in the capacity of bus operators. Those who e thought to be temperamentally unsuited for con- ion into operators of motor vehicles were trans- red to other divisions to operate cars there. Two mechanics who formerly worked in the pits at the th Lexington carhouse have been converted into o mechanics, and one extra man has been hired. A shopmen were laid off.

At Natick, the Middlesex & Boston Street Railway rates five buses on a crosstown line. Here the situa- n is similar to that at Lexington, and the same gen- l method of operation is followed. Service on 10 es of railway route has been suspended. Buses rate from South Wayland to Natick, a distance of 8 es, and a branch line covers 2 miles more. Because very light traffic at the ends, the bus routes have been rtened a little from what the car routes used to be. e motor vehicles are housed here in a converted car- se similar to that at Lexington.

Contracts have been made with the town of Wayland the regular transportation of school children and th the Roxbury Carpet Company for carrying its ployees. In order to handle this service properly the lway has just purchased an additional bus.

# The Readers' Forum

## *Comments on Foreign Report**

METROPOLITAN ELECTRIC TRAMWAYS LIMITED
LONDON UNITED TRAMWAYS LIMITED
SOUTH METROPOLITAN ELECTRIC TRAMWAYS & LIGHTING COMPANY LIMITED
55 Broadway, Westminster,
London, S.W. 1.

Nov. 19, 1924.

I have to acknowledge receipt of your letter of the th inst. and am very glad that you and your depu- tion, while having a very strenuous time in this coun- y, enjoyed your visit. Any little thing that I was able do to make your visit useful and enjoyable I was ry glad to have the opportunity.

I received some few weeks ago a copy of your report nd should like to congratulate you and your colleagues n its excellence.

In a very short time you seem to have got at the ssentials of our problems in this country, especially in ondon, and I consider that your conclusions, while eing frank and in consequence all the more valuable, re in the main, correct.

It is true, as you state, that in this country there has ot been any considerable change in design of tramcars or the last 20 or 25 years. We are, I suppose, instinc- ively conservative. On the other hand, it is only fair to ealize that the zone system of fares, or rather the stage ystem of fares in this country, has prevented the devel- pment of the "pay as you enter" system which is so vell known in the States.

The time taken to collect fares, issue tickets, etc., on he platforms has been a difficulty preventing the intro- luction of "pay as you enter" principles.

Personally I believe that these difficulties are capable of solution, and some progress is being made on these tramways with platform fare collection.

Another point that you raise in your report is the question of the low average speed in this country as compared with the average speed on American systems.

I am, of course, not in a position to defend all the undertakings in this country against the charge of slow- ness of operation, but I think you will agree with me that in London at any rate the average speed of tram- cars both on our systems and on that of the London County Council is, at least, as high if not higher than the average speed of your American systems operating under similar conditions.

C. J. SPENCER,
General Manager.

METROPOLITAN DISTRICT RAILWAY COMPANY
LONDON ELECTRIC RAILWAY COMPANY
CITY & SOUTH LONDON RAILWAY COMPANY
CENTRAL LONDON RAILWAY COMPANY
55 Broadway, Westminster,
London, S.W. 1.

Nov. 21, 1924.

I received with unusual pleasure your letter of the 10th inst., and am very glad that you found your visit to the Old Country both interesting and edifying.

The report of your peregrinations was almost crowded with useful and informative data, much of which will be very handy for future reference. In the short space of time at your disposal I think that your report could hardly have been more complete, and your kindly per- sonal references are appreciated. But the pleasure was not only on your side. Our several meetings with you were most enjoyable, and the interchange of experience and thought must necessarily stimulate and widen our interests in transportation from an imperial point of view.

J. P. THOMAS,
Operating Manager.

## *Tire Failures Can Be Reduced*

THE GOODYEAR TIRE & RUBBER COMPANY
AKRON, OHIO, Nov. 19, 1924.

We wish to express our appreciation for your timely comments in the Nov. 8 issue of the ELECTRIC RAILWAY JOURNAL, under the heading "More Attention to Tiring Will Save on Re-tiring."

The rapid strides being made in the bus industry call for a close co-operation between the bus engineers as well as the actual operators of the buses. In cases where mass transportation is a factor and standees are permitted, the tires are badly overloaded and go out of service prematurely.

It has been our experience that manufacturers have equipped their units with tires of the proper size based on the seating capacity of the bus, but where overload is a factor the use of larger tires is very desirable, and is a distinct advantage for the operator.

Continuity of service is of great importance to the bus operator. When delays occur on the road due to tire failures, the loss of revenue is a serious factor, while the interruption in operating schedules seriously affects the good will of the service.

We have endeavored to assist members of the Ameri- can Electric Railway Association by making analyses of their operating conditions and making impartial recommendations regarding their tire equipment. This service is always available to members of the associa- tion.

J. M. LINFORTH,
Manager Highway Transportation Department.

*This report of the committee on foreign operation, American Electric Railway Association, was published in full in this paper, issue of Sept. 20, 1924, pages 413 to 459, inclusive.

# Association News & Discussions

## Midwest Has Good Meeting in St. Louis

### Association Hears Papers on Street Congestion, Noise Reduction, Bus Operation, Freight Haulage, the Future of the Interurban and Many Phases of Electric Railway Work of Current Interest

ON NOV. 24 and 25 approximately 150 members of the Midwest Electric Railway Association, embracing the states of Colorado, Nebraska, Oklahoma, Kansas, Arkansas and Missouri, assembled at St. Louis, Mo., for the midyear meeting of the association. Subjects of current interest, ranging from an analysis of city street congestion to a study of bus operation by electric railways, furnished a full technical program, which was supplemented by an inspection trip on Tuesday afternoon to points of interest on the property of the United Railways of St. Louis and a visit to the plant of the St. Louis Car Company.

The meeting was opened by President Charles W. Ford, general superintendent Kansas City, Clay County & St. Joseph Railway. He called on R. J. Lockwood, assistant manager for the receivers United Railways of St. Louis, to introduce, in turn, Hon. H. W. Kiel, Mayor of St. Louis, and Hon. Rolla Wells, receiver United Railways of St. Louis and former Mayor of the city. Mayor Kiel expressed a firm conviction in favor of providing rates which would make high grade service to the public possible. He warned railway men that they must keep abreast of the times and of changing conditions in their industry if they intended to continue handling the transportation facilities of the modern city.

Rolla Wells said that the primary thought of the receivers of the United Railways was to insure adequate and improved service to the public. He stressed the importance of making favorable public contact through employees. So far as the public's interest in the utilities is concerned, Mr. Wells went a step beyond Mayor Kiel in saying that the public is not only interested in the condition of the utilities, but is in a measure actually responsible for this condition because of the control which is exercised through public regulatory bodies. Restriction of the rate of fare below that necessary to render proper service involves a question of the right of any public official to restrict the quality of service rendered the public, which, he maintained, wants good service and is ready and willing to pay for it.

F. G. Buffe, general manager for the receivers Kansas City Railways, responded to the addresses of welcome. He said that the optimism expressed by the speakers relative to the future standing of the utilities in the public mind augured well for the prospects of the industry. The broadening viewpoint of railway men was held up as another encouraging sign and he pointed to the rapid crystallization of opinion in favor of fitting the motor bus into the general transportation scheme, wherever it is suitable, as an example of this. He also held that the public and the commissions are regaining confidence in the electric railways, and pointed to the popular sentiment in Kansas City in favor of the railway company operating buses, exclusively, in such locations as they are required.

#### MR. STOFFEL SHOWS PROGRESS OF FREIGHT HAULAGE BY ELECTRICS

The technical program was opened by T. H. Stoffel of the Westinghouse Electric & Manufacturing Company, who read a paper on electric railway freight haulage. A comprehensive illustrated article on this subject by Mr. Stoffel was published in the Sept. 27, 1924, issue of the ELECTRIC RAILWAY JOURNAL. In his present paper Mr. Stoffel said that the transportation of freight by electric railways has now reached a stage where it has become an important part of their business. It can no longer be considered an experiment, either from an operating or revenue producing standpoint. The results obtained from freight operation in practically every case where a consistent plan of development has been laid out and followed have more than met expectations. The gross income from this business during 1923 was three times what it was in 1913 and amounted to more than $50,000,000. In addition, the progress made in the development of freight business during the current year is greater than for any similar period in the past. Net earnings vary from 15 to 30 per cent of the gross, after paying in full all items directly chargeable to freight operation and allocating other items, including taxes, on a prorated basis.

Some of the advantages which accrue to certain classes of shippers from the service made available by electric railways were outlined by Mr. Stoffel and specific examples of such situations were described. This included instances of jobbers and manufacturers extending their markets by being in position to make electric railway deliveries in territory formerly monopolized by competitors more favorably located geographically. He also cited instances of the development of profitable merchandise business by electric lines not able to handle heavy or long-haul tonnage. This was done by active co-operation with chambers of commerce and other civic bodies in the towns for the purpose of locating new industries on the road, and by working with farmers' associations to aid them in reaching or developing new markets for farm products.

Mr. Stoffel described one situation in which the railway had been instrumental in inducing farmers to raise tomatoes on land which had formerly yielded only poor grain crops and was rewarded by the development of a thriving new canning industry that produces a very profitable freight business for the road. In another case a profitable business from handling fruit direct from grower to market was built up as the result of the railway taking the initiative in bringing the farmers and the commission men together.

The place of the motor truck in building freight business for electric lines was analyzed. Mr. Stoffel went into this subject both from the standpoint of using the truck as a feeder for extension of service into territory beyond the rail line and also for various terminal purposes. The present status of pick up and delivery service was discussed and some of the problems connected with this subject were outlined. He said that complications arise when the railway attempts to give pick up and delivery service. Shipments are forwarded subject to delivery on presentation of bill of lading only, and usually such bill of lading is at a bank attached to the draft and is not available when the shipment is delivered. This makes it necessary in many cases to haul the shipment back and forth several times before delivery can be legally effected. A consignee, such as a large department store, which may have two or three warehouses in addition to the retail store, requires shipments to be moved twice or more before correct delivery can be made. A consignee may be only a broker having desk room in an office building, in which case shipment would have to be taken back to the freight terminal and held until disposition is given.

Mr. Stoffel concluded that all rail lines will eventually find it necessary and expedient to furnish pick up and delivery service, but expressed the belief that when that time comes the service can be most economically and efficiently rendered by employing a single responsible and dependable agency to do the work for all lines in a given terminal community.

In answer to a number of questions Mr. Stoffel explained some of the various phases of pick up and delivery service in connection with freight traffic. He said that on the basis of experiments conducted by the steam railroads at Baltimore the actual cost of such service would require a charge of approximately 15 cents per 100 lb. in excess of the regular tariff. Under the

experiment being conducted there, the shipper pays the 15-cent charge at his end of the movement and the consignee pays the same charge for the delivery at the other end. He said further that where such pick up and delivery service was made optional with shippers it had not proved to be successful, as most heavy shippers were equipped with their own motor trucks and preferred to keep these busy handling their shipments to and from freight houses rather than to pay the extra charge for this service by the railroad. He said that such optional service was used most by the infrequent shipper, and that the tonnage on this class of business was very light and did not pay for the service. Another objection to optional pick up and delivery service was held to be the delay caused by the necessity of the agent to determine whether or not such service is desired on each shipment.

### Discussion on Street Congestion Remedies

City transportation and congestion were treated in a paper by C. E. Smith, consulting engineer city of St. Louis, which is printed elsewhere in this issue. In the discussion of the paper Mr. Bennett of the United Railways said that although he was heartily in accord with no parking regulations a large part of the short-haul riding produced on street cars by such regulation would come in the rush hour, thus increasing the peak on the railway. R. P. Woods, vice-president and general manager Kansas City, Clay County & St. Joseph Railway, said that marking of arterial highways was a forward step recently taken in Kansas City. He also felt that no-parking regulations should be made to meet the specific conditions existing at certain points in the business district. Raised safety platforms are impracticable on narrow streets, according to Mr. Woods, and are objected to by fire departments.

Samuel Weimer, chairman of the rapid transit committee of the St. Louis Board of Aldermen, expressed the belief that a subway for street cars in St. Louis would be beneficial and was practicable. He said that buses and street cars on the same streets increased congestion and that one or the other must be taken off.

The use of the bus in city transportation service was the subject of a paper presented by B. Hilburn, general manager Tulsa Street Railway, which will be abstracted in a later issue. Discussing the paper, A. E. Reynolds, vice-president and general manager Springfield Traction Company, said that the selection of the proper type of bus to meet the service requirements was a difficult problem. He expressed the conviction that there is a place and a future for the bus in the general scheme of city transportation.

E. R. Kinsey, president of the Board of Public Service of St. Louis, said that the bus is here to stay and that it has a useful field to serve. He maintained that every rapidly growing city needs some form of flexible transportation to give service in new communities where railway extensions are not practicable financially. It is not reasonable to expect the railway company to speculate on the development of a new community to the extent of making the heavy investment required to put in an extension of the rail service, and consequently he felt that during the period of development the bus is the logical form of transportation until the community grows to a point where the increased traffic justifies the extension of the rail line. Buses should be on the same footing as railways in regard to regulation, according to Mr. Kinsey, and the existing utility company should handle the entire transportation service of the city, including the buses. This makes for economy and efficiency, he said, because of the elimination of unnecessary duplication of service. However, bus service should be given where there is a demand for it and where the people are willing to pay the increased fare necessary to support this service. Allowing independently operated buses to skim off the cream of the profitable traffic in competition with street cars works to the ultimate ruin of the entire transportation service of any city.

In answer to a question, Mr. Hilburn said that the company is operating 16 and 25-passenger buses in Tulsa and that the saving in cost of gas on the smaller vehicle is offset by the increased maintenance. Comparatively high maintenance is caused by lack of provision in the design for overloads. The total operating cost was given at 19 cents per bus-mile, including 3 cents for depreciation and 1¼ cents for insurance. He said that insurance was purchased on a mileage basis, the rate being the figure given. In answer to another question, he said that the total amount paid by the insurance companies in settlement of claims was less than the accumulated premium paid.

Mr. Woods outlined some of the experiences of the Kansas City, Clay County & St. Joseph Railway in going into the bus business to fight competition by independent operators paralleling the interurban line. He said that modern bus equipment in competition with the railway had caused a serious drop in the gross income, and that this had forced them to fight the competition by putting buses of their own into service. Study of the effect of a new hard road which was built parallel to the interurban, he said, disclosed the fact that 19 per cent of the passenger business lost was attributed to the use of private automobiles.

### Interurbans Must Introduce New Services and New Selling

A paper by D. W. Snyder, vice-president Illinois Power & Light Company, on the future of the interurban was delivered on Tuesday morning. This future, Mr. Snyder pointed out, is uncertain only in the same sense as that of any other business in process of evolution. The passing out of some of the smaller and weaker roads has created a false impression of the status of the electric railways. He attributed these failures to the natural reaction from a boom building period in which some roads were built that were not justified by density of population or conditions of competition.

The situation of the interurban road following the advent of the hard roads and the bus was likened to that of the barber shop when the safety razor was introduced. By making their shops more attractive and by pushing other lines like massages, shampooing, hair singeing, etc., the barber has actually put his business on a higher plane and has become much more prosperous than when his very existence was threatened by the safety razor. It was pointed out that the barber accomplished this by first putting his business in better position to serve his customers, and then adopted modern methods of selling this improved service to the public. Similar methods, it was held, would assure a useful and profitable future for the electric railways.

Results accomplished by the North Shore Line in going from receivership to the first Coffin prize in seven years were held up as a shining example of what can be done by proper management. Although the North Shore Line is in a special situation, he maintained that the same fundamental methods would apply to the industry as a whole. He advocated building on the principle that the first essential in selling service is to have good service to sell.

Mr. Snyder felt that more publicity should be given to the comparative cost of travel by automobile and interurban, and cited experience on the Illinois Valley division of the Illinois Traction System as an example of what could be done in inducing traveling salesmen to use the interurban. He said we have heard much about modernization, but that as a whole the industry has not yet grasped the full significance of what modern equipment and methods will do in reducing operating costs and attracting new business.

### Interurbans Especially Can Utilize the Bus

Although the motor bus can be and has been ruinously destructive to interurban electric railways when allowed to compete unrestrictedly, this vehicle is only another transportation tool, Mr. Snyder said, which in the hands of competent transportation men can be profitably applied to improve existing facilities and attract new business. He felt that there are few interurban railways that cannot make use of the motor bus, and none that can afford to ignore it. He sounded a note of caution, however, by saying that even now the same ill-advised overexpansion that has marked the development in other lines of business is going on in the introduction of buses in some situations.

### Freight Business Offers Great Possibilities

Referring to the growth of freight and express business, Mr. Snyder said that the future is far from gloomy. He cited the recent completion of a $1,000,000 freight terminal in Indianapolis as an example of the proportions which this business is beginning to assume. Last year's gross freight revenue on the North Shore Line exceeded its total revenue of eight years ago from all sources. Statistics prepared by the A. E. R. A. showed an increase in electric railway freight business during 1923 of 35 per cent. The Illinois Traction System freight business is now greater than its passenger business. He said that 32 electric locomo-

tives are now in service on his road for handling this business and that the first of six new 80-ton locomotives of the articulated type has been put into service. Long-haul freight business is being developed, M. C. B. standard equipment is used and is interchanged with steam roads. Through rates, switching agreements and physical connections have been established with practically all steam railroads.

In the discussion, he advocated development of local trucking business by short interurban lines serving a number of towns. He pointed out that inefficient methods and improper maintenance make present independent truckers very wasteful, whereas an organized trucking service would attract business and make substantial savings in operating costs. He said the time has come for the small interurban lines to go into the trucking business, and unless they do so other interests will organize the terminal trucking within the towns they serve, and will then expand this service to duplicate that given by the railway between the towns.

A paper by R. W. Bailey, superintendent of the power and equipment Kansas City Railways, on the subject of noise reduction will be published in an early issue. In the discussion it was brought out that the practice of casting graphite plugs into comparatively hard brake shoe material is being tried out and seems to reduce materially the squealing of such shoes.

### Bus Subsidiaries of Railways Eligible to Membership

In the business session that followed the prepared papers Mr. Lockwood brought in a report prepared by a special committee on revision of the by-laws, which changes the rules of the association so as to admit bus subsidiaries of railway companies as active members and allows the representatives of bus manufacturers to join the association as associate members. This report was adopted. The resignation of Charles W. Ford as president of the association to take effect Dec. 1, at which time he will sever his connection as general superintendent of the Kansas City, Clay County & St. Joseph Railway to become a member of the sales organization of the Yellow Coach Manufacturing Company, was accepted by the executive committee. A special committee was appointed to draw up a resolution of appreciation of Mr. Ford's services to the association, and he was also elected to honorary membership. The executive committee elected Ernest Stenger, receiver Denver Tramway, president, to fill the unexpired term of Mr. Ford, and elevated R. B. Campbell, secretary and general manager the Arkansas Valley Interurban Railway, to the office of vice-president. Bruce Cameron, vice-president and general manager Joplin & Pittsburg Railway, was elected to fill the place made vacant on the executive committee.

At the banquet on Monday evening J. C. Hall, legal representative Missouri Public Utility Association, advocated increased interest on the part of utility men in legislative activity. He said that such interest should be directed toward supplying members of the legislatures with authentic information regarding the utility business. There has been a woeful lack of such activity in the past, with the result that indiscriminate competition and many other conditions detrimental to the service and growth of the utilities have been permitted to exist.

E. F. Wickwire, vice-president Ohio Brass Company, told of the work that is being carried on through the American Association for "friendlyizing" the public and also told of the publicity given the pleasant good-natured "Traction Tom" conception of the electric railway industry to take the place the despotic "Traction Baron" attitu which had been allowed to develop the minds of the public and the pre Mr. Wickwire closed a humorous a entertaining presentation of this subje with the serious admonition that an thing can be accomplished in the wo of improving public opinion providi personal ambition is subordinated the general objective of promoting t welfare of the industry. This thoug was summarized in the words, "An thing can be accomplished if no c cares who gets the credit."

# City Transportation and Street Congestion*

## Importance and Permanence of the Street Railway in Any Scheme Local Transportation and Various Methods of Relieving Street Congestion, Speeding Up Cars and Attracting Patronage

By C. E. Smith
Consulting Engineer City of St. Louis

TRAFFIC congestion came on suddenly with the automobile and will continue in varying degree depending on the success of relief measures. Business men are not yet thoroughly awake to a realization of the importance of the traffic congestion evil.

It is axiomatic that the transit lines should offer the smallest possible interference with other traffic, should be least interfered with, and should promote comfort and convenience to the greatest number. Nevertheless, the street car has been the worst sufferer from the increasing use of the automobile, because: (1) The normal increase in street railway business has been interrupted; (2) accidents and consequent costs of operation have increased; (3) service has slowed down, and as the automobile has educated the people to higher speeds they have been less tolerant of the speed of street cars; (4) there is a popular idea that the street car should be taken out of the way of other traffic and that it should be superseded by other means of transit. That the latter is not true is proved by the fact that each year the street railways of the country establish new records for passengers carried, showing that in spite of the auto bus and automobile which will supplement and not supersede the street cars, they are here to stay and must be provided for.

Even in New York City, which has the greatest measure of rapid transit and bus service, the street car business continues to increase. In 1923 more than 1,000,000,000 passengers were carried on street cars there, rapid transit lines carried 1,500,000,000, and the buses about 100,000,000. Even in London, where buses are used to the greatest practicable extent, the street cars carry more than half the surface travel.

There is ample evidence that street cars carry more than other agencies of transportation and take less space on the streets. Thus, in the Chicago Loop district 50 per cent of the traffic consists of automobiles that carry 19 p cent of the traveling people, wh street cars that constitute about 2 p cent of the street traffic carry 74 p cent. In Baltimore a traffic cens showed that street cars, less than 15 p cent of the traffic, carried 89 per ce of the people, while other vehicles co stituting 85 per cent of the traffic ca ried only 11 per cent. In Los Angel during a rush hour street cars co stituting 4 per cent of the traffic car 66 per cent of the people, while oth vehicles constituting 96 per cent of t traffic carry 34 per cent. Sim figures might be continued indefinitel A conservative estimate would place t street car riders at not less than per cent of the traveling public. would seem that their interests shou have at least 75 per cent of the consi eration.

City transportation for the gre masses of people must continue to provided by street cars. The peculi nature of this business, requiring large investment in proportion to t revenues, and preventing expenses fr being increased or decreased in propo tion to changes in volume of busine makes it peculiarly susceptible changes in business conditions.

Nothing is clearer today to tho familiar with the problem than th competition in street transportation wasteful and must be eliminated so th facilities may be best co-ordinated wi the traffic. Particularly must street c service be protected from unfair co petition of favored, subsidized or u regulated agencies of transportati Otherwise the mainstay of the publi transportation system will break do and the great mass of the people w struggle along with inadequate tra portation facilities.

Until the advent of the automob the street car was the fastest means transportation for general use in cit without rapid transit facilities, and is still and will continue to be the p ferred vehicle for mass transportati properly co-ordinated with bus servi as may be expedient. But people a less tolerant of slow motion than ev

*Paper presented before meeting of Midwest Electric Railway Association at St. Louis, Nov. 24-25, 1924.

fore, and the average of 10 m.p.h. ade by city street cars no longer ems attractive. Speed is the slogan the day and it seems that people e intolerant of even a moment's de- y. The automobile is responsible for is speed mania.

It is most irritating to car riders to ag along while the motorman kills ne in slack hours because his hedule time is too long or for other asons. Slack time and needless stops d waits should be rigidly eliminated om the schedules of both city and terurban properties. The drift of reet car passengers to automobiles ill decrease and may actually turn ck if the service can be speeded up d generally made more attractive.

There are many places where, by rea- n of former competitive and dupli- te railway service, street car lines e unnecessarily long and may be ortened and reduced in number by a refully studied plan of rerouting. ch a study in St. Louis indicated at 25 or 30 miles of track might be ne away with and service improved rerouting. This is being carried out little at a time. When handled prop- ly the cost is small. Another way in hich service may be improved, where nditions are favorable, is to run street rs express through areas of light siness between areas of heavy load- g and unloading, the intermediate siness being handled by buses. This being done successfully at Provi- nce, R. I. (see ELECTRIC RAILWAY URNAL for March 15, 1924, page 1).

Both relief of congestion and im- oved transportation service in cities ll be secured by the following easures:

1. Unification of all systems of trans- rtation within a city, including street rs, buses and other agencies of mass ansportation.
2. Single fare and free transfers thin a single-fare zone, with appro- iate charges beyond.
3. Expansion of facilities in amount d character best suited to the rvice.
4. Route through traffic so as to oid the congested business areas.
5. Speed up service whenever pos- ble; shorten schedule time in off-peak urs.
6. Establish loading platforms on sy streets for protection and con- nience of car riders.
7. Provide storage yards for cars in just outside business districts to ore peak-hour cars during day and us avoid interference with other affic and dead mileage when taking em out empty in the morning and ck empty before the evening rush.
8. Reduce looping of cars and turn- cks in congested districts and operate rough runs to the greatest possible tent.
9. Avoid crossing of busy lines in ngested districts.

City planners are quite free in commending as one of the ways of ducing or rather avoiding increased ngestion in business centers that ilding heights be restricted. The ght to do this has been amply sus- ined in the courts. Boston is a table example in this country. There building heights have been restricted for about 25 years. But that precaution would seem to safeguard the interests of succeeding generations rather than to offer any measure of relief now.

Building heights may not be so easily controlled. Regulations to that end are welcomed in the abstract but not in the concrete. In a large mid-Western city the City Plan Commission recommended an ordinance to restrict building heights to 120 ft. The Board of Aldermen after public hearings and over the protest of the City Plan Commission established 150 ft. as the maximum height. Shortly thereafter the chairman of the City Plan Commission, as the architect for an owner, defended and helped to secure the passage of an ordinance for a new building 280 ft. high, although he had previously appeared in protest against the ordinance allowing 150 ft. in the same location.

Whether traffic congestion is increased more by high buildings than by the increased travel made necessary when business is transacted in smaller buildings spread over a larger area is still worthy of further discussion. Certainly the cost of transacting business over a larger area is more expensive and raises the question of whether concentrated business or traffic congestion shall control. The tremendous investments for aggregations of large buildings would appear to justify the concentration of business; the property values and concentration of travel resulting therefrom create conditions that permit expenditures for rapid transit and other expensive means of transportation that would be impossible if they had to be spread over a great area.

Boston has had a stringent law restricting building heights for many years, the result of which has been to spread the business district over a large area. Apparently this has brought into the district many automobiles that might not be used if business were transacted in a smaller area. Notwithstanding the low buildings and the enlarged business area, Boston traffic congestion is so bad that recently a new street through the business district was recommended for relief at a cost of about $30,000,000. There is nothing in the Boston situation that would indicate that the restriction of building heights has ameliorated traffic congestion.

On the other hand, in New York City, where there has been no control of building heights, the surface traffic congestion in the districts containing the tallest buildings is no worse than in Boston. True, there is terrific crowding and congestion of the underground transit facilities, but that is because the facilities have not been provided to keep pace with the volume of traffic, by reason of a deplorable controversy between state and city authority. Engineers long ago determined on additional facilities, and New York can well afford to provide them. The annual charge on each $100,000,000 of public money spent there amounts to only about $1 per capita of population per year, so the end of New York's spending capacity for the improvement of local transportation is quite far off.

Decentralization has been suggested by many as one permanent solution of the traffic problem; that is, the development of a number of outlying business districts. This is apparently taking place to a greater extent than ever before in most large cities, but there is no indication that it will materially decrease the importance and expansion of the main business center, where most of the congestion troubles are experienced. Rather it appears that each additional outlying district creates new centers of congestion and raises problems which may cost more in the aggregate to solve than if more intensive remedies be applied to a centralized area. There is no doubt in my mind that decentralization will result in increasing the amount of automobile traffic between the various centers while at the same time street car travel may also be increased correspondingly. In spite of traffic congestion and in spite of the growth of outlying business centers, surveys of downtown business show conclusively that business there continues to increase. In the case of the large department stores, this is much greater even than would normally be expected.

Traffic conditions in the congested central business district can be relieved by moving out of it certain lines of business or trades that can be transacted as well or better elsewhere. Thus the writer recently recommended, after a careful survey, that the fruit and produce merchants be moved from the most congested part of the retail district at New Orleans to a much more suitable location 2 miles away. Similar results are about to be realized in Chicago by the movement of that business out of the congested Water Street district. This method may be applied to other lines of business, always, however, with the possibility that there may be a drop in property values in the old district that may or may not be recovered.

### EVERY CITY SHOULD HAVE A CITY PLAN

Every city large enough to have a street railway system should have a city plan, the foundation of which, from a traffic standpoint, should be a major street plan. As the great majority of the people depend upon street cars for their transportation, the interests of these car riders should be represented by the street car company's officials taking a keen and continuing interest in the planning as it affects street car service and traffic control. The ELECTRIC RAILWAY JOURNAL of March 8, 1924, after the American Electric Railway Association meeting in St. Louis on March 4, said: "To emphasize the importance of railway men taking part in the broad planning for relief of street congestion, it may be said that while they are only indirectly interested in some of the planning, they will directly profit or suffer by the success or failure of the broad relief plan considered as a whole."

In city planning more attention should be given to the improvement of marginal streets around the edge of the congested districts so that traffic may be detoured. At present, streets leading directly into the congested districts are being widened and improved at a cost of millions of dollars, while

smaller expenditures on marginal streets would in many cases give better results. Such streets will be of particular importance in providing free routes to and from garages on the edges of such districts, thus keeping many automobiles out of the area of congestion.

In addition to providing for proper street circulation, the city plan should give attention to transit, railroad facilities, grade crossings, zoning, etc. In planning for the future it is well to keep in mind that all the needed improvements will not be made at once. Wherever cutoffs and street widening projects have been carried out, the benefits have usually exceeded the cost. While the cost for some of these improvements seems high, it does not amount to much per capita when spread over the entire community. In fact, city government is one of the cheapest benefits we possess, as it costs only from 10 to 20 cents per capita per day, and very considerable public expenditures can be undertaken without being felt very seriously.

Many palliatives have been suggested for the relief of traffic congestion. The Midyear Meeting of the American Electric Railway Association held at St. Louis on March 4, 1924, was devoted to this subject. Abstracts of the papers presented are contained in the March 8 issue of the ELECTRIC RAILWAY JOURNAL. It was brought out in that meeting that means should be found to secure the best use of present facilities before making large expenditures for new construction. Mr. Bartholomew, engineer of the City Plan Commission of St. Louis, said: "During the rush hour, when every available square foot of roadway ought to be devoted to movement, parked cars absorb 20 per cent of the roadway. The vehicular flow, thus restricted and confined to narrower channels, slows down to such an extent that from 50 to 100 more street cars accumulate in the district than should be there according to schedule. Two thousand vacant standing automobiles cause the street cars, carrying 75,000 or more persons home from work, to lose from 5 to 15 minutes of scheduled time."

One of the very best things that could be done to remedy this would be to stagger the hours of offices, stores and factories, but unfortunately it is difficult to do enough of this appreciably to relieve the congestion. City traffic control can help in the following ways:

1. Left turns should be prohibited as far as reasonably practicable.
2. Width of commercial vehicles should be limited to not more than 8 ft.
3. Automatic traffic signals should not be installed at intersections in congested districts, but such control should be effected by means of traffic officers. (It was thought that synchronized traffic control by automatic signals would serve well in such places, but where tried—as at Los Angeles—the results were disappointing because of the varying traffic at the different intersections.)
4. Traffic officers should be instructed to give right of way immediately to street cars when the gong rings ready to go.
5. Pedestrians should be compelled to move with the traffic and to wait for signal.
6. One-way streets should be established. (Excellent results have been secured from this in New York, Philadelphia, Boston, St. Louis, Pittsburgh, New Orleans and many other cities.)
7. Use of streets in congested districts should be prohibited to trucks and drays during rush hours.
8. Parades in congested districts should be absolutely prohibited.
9. Truck service to buildings during night hours should be encouraged, also during slack hours of the day.
10. Individual heating and power plants within the congested district should be shut down and service secured from central public utility plants removed from the congested area.
11. Building occupants who continually occupy street space for loading or unloading trucks should be compelled to use alleys or provide set-back spaces for trucks within their own buildings.
12. Where parking is permitted in the business district it is desirable to keep the automobiles off streets occupied by street cars. (A survey of all cars parked in the streets day after day may be used to ascertain the owner, his business, the necessity for his car downtown. If the car is not necessary in his business effort should be made to determine why it should not be kept at home. Good results were thus secured at Boston.)
13. Autos should be compelled to be parked within 6 in. of curb and provide not less than 5 ft. of space between parked cars to avoid delays to other traffic when getting in and out of parking place.

The movement of traffic within the congested districts is most seriously hampered today by the parked automobile and by moving automobiles that might be kept out of the district by proper planning and regulations. It is the practically unanimous opinion of all who study the problem that parking must be totally prohibited in such districts. Parking at the curb is an inheritance from the horse and wagon days and the hitching post. In those days the street widths were generally in excess of the traffic requirements, and no harm was done by such hitching. But the same streets are totally inadequate for present-day traffic that could not have been foreseen when they were laid out, and automobile parking in them causes great harm. The provision of parking space for automobiles is not a public duty and there is no equity in thus withdrawing valuable street space that is needed to expedite moving traffic.

Parking in the congested district will soon be a thing of the past. There is no justification for it. The automobile owners would never think of paying taxes, upkeep and a fair return on the value of the property occupied by standing cars. Why should they have its use free, especially when this space is imperatively demanded for more important use? There would seem to be no more equity in allowing this parking than to allow merchants to set up booths for the sale of goods in an equal area of the streets. By forcing owners to store their cars at points that may be somewhat removed from their offices, fewer automobiles will be driven downtown. This will still further help other necessary traffic movement.

Where no-parking rules are enforced, it should be done after and to the extent to which garage facilities are provided, and over a considerable area. Such a rule cannot be enforced on a single street within a district without upsetting the balance of trade. Automobiles will continue to be parked around the corners and on the next streets. The cleared street will be used as a thoroughfare on which there may be less local business transacted than when parking was permitted. Where the no-parking rule has been applied to a single street it has been modified later at the request of the merchants to permit parking for short periods up to one hour. This gives little permanent improvement in conditions. The curb is soon full all the time, and in fact, the movements to and from the curb interfere with and delay traffic more than all-day parking, and create dangers of collisions and accidents. A considerable part of the automobile traffic in congested districts is due to cruising around looking for parking places.

A better treatment is gradually to enlarge the no-parking area as fast as garage facilities are available. In the larger cities it will not be possible to support the most expensive property by garage rentals, and the storage will be somewhat removed from the centers of the district. In St. Louis a number of private garages have been constructed around the business district, but they are generally about five city blocks from the center. This distance and the rentals will discourage idle driving of autos downtown and confine it to those whose business demands will afford that cost. In the medium-sized cities it will be possible to locate garages and storage places at various strategic points in and around the business district to the great convenience of the drivers. Kansas City is a good example of this; there are numerous parking places which are so scattered as to be convenient to every part of the district.

In smaller sized cities, where there are many one and two-story buildings in the business centers, there is no good reason why the basements or roofs of such buildings cannot be made available for auto storage by means of ramps and advance preparation. In such cities there is the same parking problem as in the larger cities, but of course over a smaller area.

Traffic outside the congested district may be expedited and simplified by separating it into classes. It is desirable where several parallel streets are available for traffic to have car tracks not more frequent than on alternate streets, the other streets to have wide smooth pavements to attract automobile traffic away from the street cars.

Where such parallel streets are not available, a study of the city plan will frequently show how sections of streets may be connected by extending them across private property and widening

them when necessary to get an adequate through street system. Streets occupied by car tracks should be paved for not less than 40 ft. between curbs where there is no through traffic, and preferably 60 ft. between curbs where there is through traffic and parking is permitted. Autos should be compelled to stop before entering or crossing streets with car tracks.

Minimum speed as well as the maximum should be specified for slow moving vehicles on certain streets. Trucks should be prohibited from certain streets where they would interfere with the free movement of street cars and other traffic.

In isolated cases where intersecting traffic is very heavy and the topography is favorable, it may be desirable to separate the grades of intersecting streets, either for street cars or all traffic. This has already been proposed for several cities. Where streets are wide enough to divide into three parts, traffic will be expedited and accidents reduced by providing a street car space between curbs in the center of the street and a roadway on each side, not less than 25 ft. wide and preferably not less than 30 ft. On Delmar Avenue, St. Louis, where the car tracks occupy a separate space curbed off in the middle of the street for about a mile, a saving of 3 minutes results in the rush hours, and accidents have been much less than where the tracks are in the open street beyond each end of the curbed space, as indicated by the following figures: 3,800 ft. in the open street to east in 5 months had 80 accidents; 5,400 ft. in the curbed space in 5 months had 15 accidents; 5,000 ft. in the open street to west in 5 months had 39 accidents.

Most of the accidents in the curbed space were at street crossings. As far as possible it is a good thing to compel different kinds of traffic to follow different lanes, and in some instances this might be carried so far as physically to separate them by curbs or other devices.

The enforcement of traffic regulations requires a large police or traffic squad with persistence and determination. This enforcement of traffic regulations should be under a separate department with adequate laws, funds for checking and enforcement, court backing and determination. An important feature of traffic control should be the examination of automobile drivers for age, knowledge of traffic rules, hearing and good sense before a license is issued.

It is simpler to enforce a no-parking rule than a limited-time rule. The latter requires more policing and careful records of arriving and departing cars. In either case the law should provide for impounding the cars of violators, and they should be hauled to the pound just as soon as they violate the laws. Kansas City and New Orleans, in particular, have had good results from such positive enforcement of the law. Such rigid enforcement is more effective than toleration, reminders and light penalties.

# The Articulated Car*

## A Résumé of Existing Designs of This Type of Car for Surface Line, Rapid Transit and Railroad Service

By W. G. Gove

Superintendent of Equipment Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y.

THE introduction of the principle of articulating steam railway cars is said to have originated in England, the first trains being placed in service on the Great Northern Railway. There are now more than 200 sets in service. These English articulated cars range in length from two-body suburban cars to a five-body car which includes a dining section permanently incorporated in the middle of the unit. A two-body articulated sleeping car has also been introduced. In September 1924, a three-body articulated car was placed in service on the London & North Eastern Railway, consisting of a kitchen body articulated with a dining saloon body at either end. A two-body articulated car has also been introduced in the Royal Mail Service, Great Indian Peninsula Railway of India.

All these cars were built from designs furnished by the Leeds (England) Forge Company under the British patent No. 4512 of 1907, issued to H. N. Gresley, chief engineer Great Northern Railway. On April 11, 1922, United States Patent No. 1,412,053 was issued to Mr. Gresley, who described a form of articulated car support combined with draft springs. We understand that this patent is controlled in this country by the Commonwealth Steel Casting Company of St. Louis. The objective on the English roads was primarily reduction in weight and in first cost. This depends upon the number of bodies composing the car. The principal items omitted from a two-body car are one truck, two drawbars and couplers, two draft gears, two sets of buffers, two end sill constructions, various parts of brake rigging and sundry incidental items of equipment. The saving accomplished by articulating five bodies on six trucks, as in England, is said to have amounted to 20 per cent in weight and 8 per cent in first cost.

### Nomenclature Proposed

In preparing this paper I have been confronted with the difficulty of employing appropriate and brief terms specially characteristic of the articulated car. For the purpose of brevity and accuracy I will use the following terms:

*Articulated Car* — A multiple-bodied vehicle having the adjacent ends of the bodies supported by a single truck. In this connection an articulated car having two bodies is a *duplex car*, one having three bodies is a *triplex car*, one having four bodies is a *quad car*.

*The Pilot Truck* is at the outer end of the car. *The Pivot Truck* is at the point of articulation. The inclosed passageway at point of articulation



Detailed View of Drum Connection on Milwaukee Articulated Car



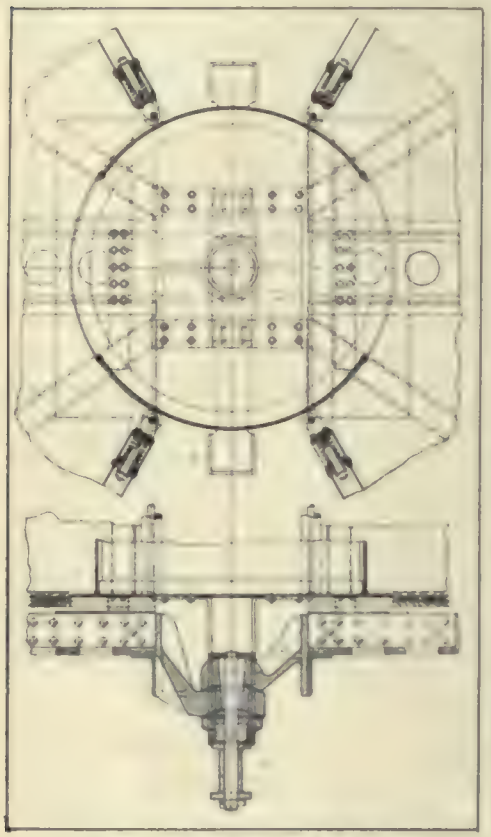
Recent Type of Milwaukee Articulated Car, Using Drum Connection

*Abstract of a paper presented before the New York Railroad Club, Nov. 21, 1924.

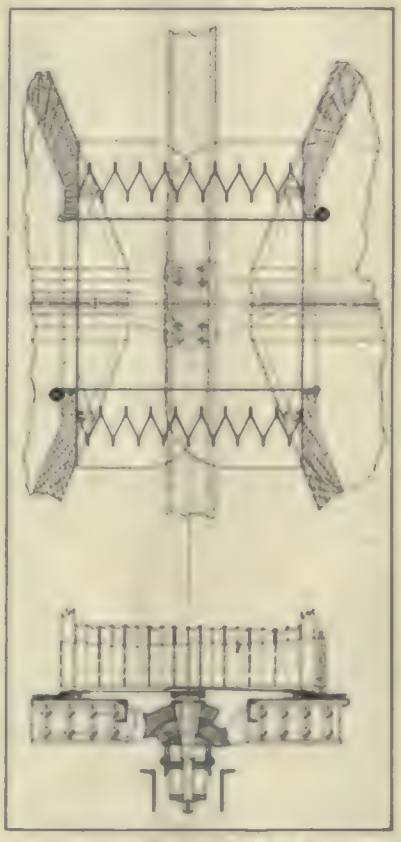
when cylindrical is a *Drum;* when with an expanding canvas diaphragm, it is a *Bellows.*

At the present time the design and operation of articulated cars in the United States is in the early state of development. Considerable progress has already been made, but the practicability of some features remain to be demonstrated under prolonged operating conditions.

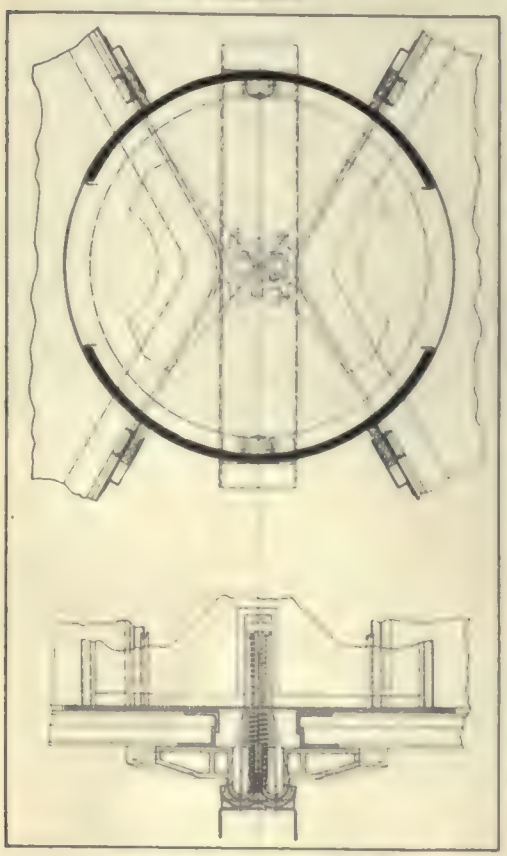
The most prominent examples of articulated cars in this country are on the following railways: The Milwaukee Electric Railway & Light Company; Department of Street Railways, city of Detroit; Brooklyn-Manhattan Transit Corporation, surface division; United Railways & Electric Company, Baltimore; Brooklyn-Manhattan Transit Corporation, subway division.



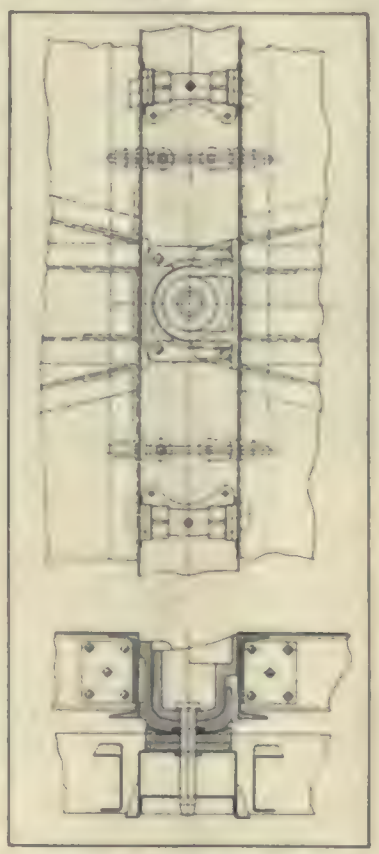
Brooklyn Duplex Car for Surface Operation



Milwaukee Duplex Car for Surface Operation



Detroit Municipal Triplex Car



London & North-Eastern Car

**Details of Connections and Passageways for Articulation in the Principal Designs**

The Milwaukee Electric Railway is now engaged in a rebuilding program which will ultimately couple 384 bodies into 192 cars. Of these there are now in service 103 articulated cars of two bodies each, connected at the point of articulation by a weathertight passageway mounted on the pivot truck. On the first articulated cars in Milwaukee the passageways were of the bellows type, while the latest cars are fitted with steel drums. The pivot truck is an idler and each of the two pilot trucks has two motors. The cars are arranged for double-end operation. Each platform controller is connected with a full set of resistance on its own body of the car, thus reducing the number of wires carried from body to body across the pivot truck. [This car was described in the issue of ELECTRIC RAILWAY JOURNAL for Jan. 15, 1921, page 131.—EDS.]

The Department of Street Railways, city of Detroit has in operation an articulated car giving excellent service on the most congested route in the city. The car is composed of three center-entrance, center-exit steel bodies mounted on four trucks and arranged for single-end operation. The pilot trucks are fitted with motors, the pivot trucks are idlers. The distribution of the weight is such that 56 per cent of the total weight without passengers is on the driving wheels. [This car was described in the issue of ELECTRIC RAILWAY JOURNAL for arch 8, 1924, page 357.—EDS.]

In February, 1924, the Brooklyn-Manhattan Transit Corporation placed in service a two-body, three-truck articulated car. This vehicle, known on the road as the "duplex car," was constructed from the bodies of two cars which had been in service for some years. The bodies are connected by a drum of ample size to permit of a clear passage while the car is operating on the shortest radius curve. The over-all length of the car is 63 ft. 10 in., with seats for 71 passengers. The standing room will accommodate about 100 more passengers under rush-hour conditions. [This car was described in the ELECTRIC RAILWAY JOURNAL for Feb. 16, 1924, page 252.—EDS.]

### THE BALTIMORE CAR

The United Railways & Electric Company of Baltimore has recently placed in service a two-body articulated car formed from two standard semi-convertibles. It is fitted for double-end operation with four motors. The over-all length is 74 ft. 8 in. The total weight of the car without passenger load is 67,800 lb. The total seating capacity is 87 and there is standing space for 78 passengers. The passageway between cars is of the drum type. The motor leads are carried from body to



The Center-Exit Door Is Retained in the Baltimore Car Immediately to the Rear of the Center Drum

ody by way of a junction box supported on the top of the drum. Nine more articulated cars are to be built t once by this road.

### Brooklyn Car for Rapid Transit Service

Constantly increasing density of raffic has led the New York Rapid ransit Company to place an order with he Pressed Steel Car Company for our cars, each consisting of three rticulated body sections, for service n the subway. The bodies and trucks losely conform in design to those in se on this system. The three bodies ill be mounted on four trucks, with an ver-all length of 137 ft. The unit has eats for 160 passengers and a total apacity of 550. The total weight light s 175,000 lb., or about 1,100 lb. per eated passenger. This compares with he weight of 1,230 lb. per seated passenger of the single body type of cars n this same service.

A drum type passageway connects he bodies, affording opportunity for ree circulation of passengers. These ars are equipped for operation in rains and are fitted with wide doors at heir ends. The overhang is reduced o permit free passage between cars hroughout the train even on the shortest radius curves of the system.

Each car is fitted on each side with six doors, each opening 4 ft. in the clear. The conductor operates all doors from his position at the rear of the car. When two such cars are coupled together one trainman operates the doors of both cars from his position at their adjacent ends.

The two trucks at the outer ends are fitted with motors, and the two intermediate pivot trucks are idlers. The equipment is also distributed to balance the weight on the trucks to the greatest advantage, the two air compressors being located on the intermediate section and a multiple-unit control equipment located near each motor truck. The hand brake and foundation brake rigging is all placed on the end sections.

The bodies and trucks are being built by the Pressed Steel Car Company. The air brake equipment will be furnished by the Westinghouse Traction Brake Company and will include the latest form of empty and load brake which automatically adjusts the brake shoe pressure and the current input to the motors to correspond with the total weight of the passengers in the car.

Two of the four cars will be equipped with motors, control and air compressors made by the General Electric Company; the other two cars will have corresponding equipment furnished by the Westinghouse Electric & Manufacturing Company. Other items of equipment will also be furnished by competing manufacturers to determine by actual equivalent service the comparative operating reliability of their respective products.

### Advantages Expected

It is confidently expected that when fully developed the system of car articulation will result in a number of desirable improvements in the operating characteristics of passenger cars either in subway, surface or interurban or steam suburban service. The hoped for improvements may be briefly outlined as follows:

*Comfort of Passengers.*—It is claimed for articulated cars in service both in Europe and this country that there is a notable improvement in their riding qualities, the lateral motion or side rolling of the body having practically disappeared. This is accounted for by the fact that the articulated car body is supported at its extreme end where it rests on the bolster of the pivot truck and consequently has no overhang. As




Details of Articulation Connections, London & North-Eastern Car

the articulated ends of the bodies are in close contact, there can be no slack between bodies, and consequently the cars start and stop smoothly. The passageway between the articulated bodies provides at all times for free and safe movement of passengers throughout the car. This passageway is also weatherproof and draftproof.

*Noise.*—One of the most disagreeable features of rapid transit subway service is noise, which is a composite of many sounds emanating from the wheels and other moving parts of the trucks, motors, gears and gear cases, as well as drawbars, safety gates and other connections between cars. These sounds are echoed and merged into an almost intolerable racket or roar by the walls of the subway or tunnel. The use of articulated cars will reduce the number of trucks, eliminate drawbars and safety gates and in consequence the noise of operation of such cars should be considerably less than a coupled train of single cars.

*Reduction in First Cost.*—The articulated units should cost less per passenger than the equivalent capacity of single cars. When forming articulated cars by rebuilding bodies of existing equipment, the salvaged material, consisting of trucks, motors, controllers and other parts of equipment, amounts to a considerable item either when returned to stock or applied to the equipment of new cars.



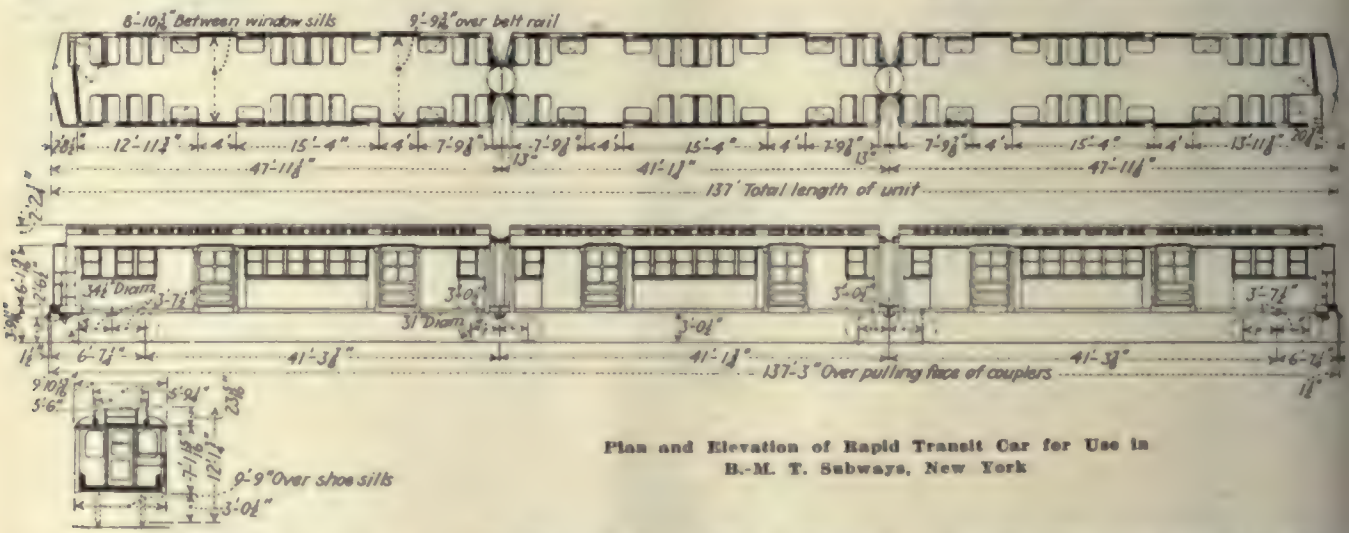
Type of Articulated Car Developed in Baltimore for Surface Operation



Interior of Baltimore Car, Showing Continuous Passageway Through the Drum

*Reduction in Weight.*—The greatest saving in weight will of course be realized when cars and trucks are specially designed for articulation and when every feature is given careful consideration from the point of view of economy in weight combined with reliability of service.

*Reduction in Operating Cost.*—There will be a direct saving in cost of energy required to operate the lighter cars with fewer trucks, a direct saving of labor in the inspection and maintenance of the consolidated units and also a reduction in the platform expense. These savings will vary according to the extent of the consolidation.




Plan and Elevation of Rapid Transit Car for Use in B.-M. T. Subways, New York

### FEATURES OF DESIGN

The items of cars and truck construction involved in the system of articulation can only be briefly referred to in this paper. The function of the members is the same in most of the cars, though the details of design may vary in accordance with specific requirements of clearance, door arrangement, etc.

*Bolsters.*—In the first articulated cars in England the outer trucks were of the usual type, but the single truck was fitted with two bolsters, the theory being that the two bodies in passing over uneven track and around curves would have a tendency to rock independently of each other and would therefore have to be supported on separate bolsters fitted with separate side bearings. Actual experience disclosed that, under the conditions prevailing, the rolling movement was actually so slight that a truck with a single bolster could be used.

*Center Plate Design.*—The design used on the English cars is such that the center plate load of one body is carried on the upper surface of the center plate of the adjoining body, the lower surface of which engages the center plate of the truck. The early designs in this country followed this arrangement. More recent designs arrange for twin car body center plates, each with a separate bearing on a common truck center plate casting. This latter arrangement provides a better opportunity for lubrication and for disengaging the articulated bodies from the pivot truck when in the shop.

*Side Bearings.*—The design of side bearings for the pivot truck will require careful attention to provide for the proper support of the pivoted ends of the bodies and at the same time permit of the necessary freedom of each body to conform to the canting caused by the elevation of the outer rail on curves, change of grade and all the various combinations of these factors. The method of support must be such that there will be no tendency to produce torsion in the bolster of the pivot truck.

*Vestibule Design.*—The articulated cars in England operate on comparatively long radius curves and consequently the flexible vestibule connections consist of accordion-like diaphragms with the edges in some cases permanently attached to the respective bodies, while in other cases the diaphragms are fitted with face plates.

In the United States the development of the articulated unit was first applied to surface cars operating on short radius curves. This has led to various forms of passageways having semi-cylindrical side walls mounted on top of the pivot truck and maintaining free communication between the bodies even when on curves of the shortest radius. These cylinders are of steel, usually with the walls lined with a temperature insulating material. The space between the cylinders and the car bodies is fitted with rollers or other devices to provide weathertight joints. The top head of the cylinder is formed to shed water and the inside of the bottom head forms the floor of the passageway.

### BIBLIOGRAPHY OF ARTICULATED CARS

September, 1908, "Jumelage de Voitures à Trois Casieux," *Revue Générale des Chemins de fer*, Paris.

March, 1912, "Twin-Carriage Suburban Trains," *Railway Engineer*, London.

October, 1913, "Jumelage de Deux Voitures au Trois Bogies," *Revue Générale des Chemins de fer*, Paris.

November 23, 1920, "The Three-Truck, Two-Car Train," J. H. Lucas, Technical League of Employees' Mutual Benefit Association, Milwaukee.

January 15, 1921, "Milwaukee Three-Truck, Two-Man Train," ELECTRIC RAILWAY JOURNAL.

October 21, 1921, "Twin Bogie Principle," *Railway Gazette*, London.

January 28, 1922, "Articulated Units Feature English Cars," *Railway Review*, Chicago.

April 28, 1923, "The Latest in Articulated Cars," ELECTRIC RAILWAY JOURNAL.

May, 1923, "Railway Articulated Sleeping Car," *Railway Engineer*, London.

May 12, 1923, Communication from J. H. Lucas, Milwaukee, regarding proposed three-body car for Detroit, ELECTRIC RAILWAY JOURNAL.

June 29, 1923, "Articulated Carriage in India," *Railway Gazette*, London.

February 16, 1924, page 262, "Brooklyn Duplex Car Placed in Service," ELECTRIC RAILWAY JOURNAL.

March 8, 1924, "Three-Car Articulated Train for Detroit," ELECTRIC RAILWAY JOURNAL.

October 3, 1924, "New Rolling Stock for East Coast Trains," *Railway Gazette*, London.

## Mass Transport Is Cure for Parking Evil

THE National Highway Traffic Association met on Dec. 2 in New York City to consider better uses for the streets. Prof. Arthur H. Blanchard of the University of Michigan was re-elected president of the association. Traffic congestion has reached such a point, it was said, that highway authorities are now worried about minimum speed rather than maximum. The problem now is to find ways to make the speed of the stream of vehicles higher so as to facilitate movement and get greater use of the highways.

Several speakers suggested that mass transportation was the principal remedy for the parking problem. This was urged by C. M. McCreery, vice-president Six-Wheel Company, Philadelphia. He believed there would be practically a revolution in mass transportation if the parking evil was eliminated. Faster schedules could be made, more and better transportation supplied. The thing to do, he said, was to keep the private automobiles out of congested areas. To make this possible street cars and buses must provide fast, comfortable, flexible and safe service.

Prof. Roger L. Morrison, in his

paper, while favoring greater use of street cars, buses, taxis, or other forms of public transportation as one method of solving the parking problem, called attention to the effect of stops at the curb. On streets where parking is not allowed, he would not permit any stops of either public service or private vehicles. If necessary, buses could be rerouted, he said, to keep them off the restricted streets.

A vehicle has no right to stop anyway, it was held by several speakers. Fundamentally the highways are for passage, and vehicles may be stopped to let off or take on passengers, or to park for various times, only at the sufferance of the public, through the legal authorities.

Ernest P. Goodrich favored a 30-second parking ordinance. He said this would prevent parking but would permit momentary stops to take on or let off passengers.

In an address on methods of forecasting future traffic and the saturation point in the utilization of motor vehicles, Mr. Goodrich told of studies made by the Russell Sage Foundation in its monumental investigation of the future of New York City and its environs. Figures collected from all over the country indicate that the number of automobiles is rapidly approaching a saturation point. In the future, residential sections of cities should be laid out with main thoroughfares about 6,000 ft. apart. On these, street cars and buses would be operated alternately. That is, the trolley and bus should work on alternate thoroughfares. The Russell Sage studies have also shown that there is an economic limit to the amount of traffic carried on any one street for the benefit of the community. Vehicular and pedestrian movement may become so dense that it would be better economy to build other streets, instead of trying to provide more space on the ones crowded. With increase in the number of lanes of traffic, even where these lanes are separated by a parkway or a line, the efficiency falls off. From the center toward the outside each successive lane carries less traffic at a given time, so the effective width of a thoroughfare is definitely limited.

Professor Blanchard, in discussing state fees for motor common carriers, said that these should consist of two parts: first, a charge based on the wear of the highways due to such carriers; second, a charge based on the direct cost of regulation.

## New England Motor Transport Conference

A CONFERENCE of those engaged in or dependent on the transportation business of New England has been called under the auspices of the National Automobile Chamber of Commerce. It will be held on Dec. 8 and 9 at the Copley Plaza Hotel, Boston, Mass. Morning and afternoon sessions will be held each day beginning at 10:30 a.m. and 2 p.m.

The problem of highway transportation in New England, both freight and passenger, will be discussed, as will co-ordination of highway transportation with other forms.

# Banker Urges Caution in Customer Ownership Financing

SPEAKING before the New Jersey Public Utilities Association at its convention in Atlantic City this week, Ralph S. Child of Bonbright & Company, New York, indicated the enormous magnitude of the funds now required annually to finance extensions and improvements in the public utility field. For the first 9 months of 1924, $1,181,434,112 of new corporate issues were brought out by power, gas and railway utilities. This is 42 per cent of the total issues for all new corporate securities. The amount for the full year in 1923 was $1,138,396,000; in 1922, $980,433,000; in 1921, $671,085,000, and in 1920, $496,822,000.

He spoke also of the now general practice of issuing "open end" mortgages with additions against new construction.

Perhaps the principal point of interest to electric railway men was Mr. Child's comment about customer ownership financing, as follows:

"I would like to dwell upon the question of 'Customer Ownership.' This method of financing has been so generally taken up by public utility companies, and has almost universally been so successful that it appears to some in the investment banking business that there are certain elements of danger which may be lost sight of.

"This success has perhaps led the managements of some companies to the conclusion that selling stock is one of the easiest things in the world to do. Statistics on customer ownership sales show that the great majority of sales are made to people of small or moderate means who have had little or no previous experience in the matter of investment. They are sold, as a rule, through the personal contact of some employee of the public utility company and on the strength of a 6½ or 7 per cent return, and because of the ease with which the stock may be purchased on the partial payment plan. These buyers of stock know little about earnings statements or balance sheets—little about property values, rate of return, or margin of safety. In fact, many companies, in their customer ownership campaigns, never show an earnings statement, the meaning of it not being understood by the average stock purchaser. The customer generally becomes a stockholder or partner in the business through sales persuasion and the fact that the investment is a local one, and that the local banker speaks well of it.

"It goes without saying that the investment banker, interested in the senior securities of public utilities, has been most favorably impressed with the development of customer ownership. Naturally the placing of this equity back of the senior securities improves just that much the position of the senior securities that the banker has marketed to the public. This may be looked upon as a selfish viewpoint on the part of the investment banker. However, it may be said that with a broad view of the public utility business, the investment banker recognizes in the customer ownership movement something of value beyond that of added equity. He sees the growing list of customers who are partners in the business making for improved public relations for the utility. He sees that this experience in investment may well develop among these customers habits of thrift which can be of national benefit, and he sees an improved understanding on the part of utility employees of the problems of their company in the conduct of its business and of the importance of their company's position in the economic life of their community. These factors mean a great deal and are looked upon by the investment banker as elements that will give added strength to the position of public utilities in the coming years.

"The banker also sees certain other angles to the question of customer ownership which from his viewpoint are equally important, though perhaps not held quite so clearly in mind by the public utility companies themselves.

"It is generally recognized that there is a definite responsibility upon a public utility to give good service. However, the responsibility assumed by the company when, through its own employee organization and its own representations, it sells stock in its enterprise to its customers, is of quite another character. That utility company has invited its customers to become partners in its business and has taken on a definite responsibility which cannot be shirked or evaded, if through a succession of circumstances something should occur to impair the value of the investment and make necessary dividend cessation.

"Obviously, in the sale of senior securities there are safeguards, such as a mortgage lien on the property and a claim on earnings prior to dividends, which are not enjoyed by the investor in preferred stock. It is vitally necessary to the continuance of the strong position of the public utility industry that there be no failure in the payment of dividends on the part of any company which has sold preferred stock to its customers. Should such a failure occur it would reflect on the entire industry and might bring about complications which would be very far-reaching and possibly have disastrous results.

"It might be added that it has been noticeable in some quarters that in view of the readiness with which stock has been sold to customers by almost every public utility company which has undertaken this kind of financing, the public utility managements have naturally been much pleased with themselves. They have perhaps not taken sufficiently into consideration that the success of their initial campaign was due to a considerable extent to the fact that the people sold were new investors, who as a rule put in money out of earnings instead of out of surplus funds, and that the employee organization entered into this work with energy and enthusiasm because it was a new and unusual job, one in which the spirit of competition and personal accomplishment counted for much."

# Maintenance of Equipment

## Keeping Fire Doors Free and Clear

IN THE Wheaton shops of the Chicago, Aurora & Elgin Railroad sheet steel screens have been made so that the operation of fire doors cannot be impeded by material care-




Sheet Steel, Reinforced Shield Protects the Fire Door from Materials and Equipment Which Might Render It Inoperative

lessly placed against them. A shield of ⅛-in. steel, reinforced at the edges and corners and braced by means of 1½-in. x ¼-in. steel, is set up around the fire door in its open position. This shield is 3 ft. high and long enough completely to protect the door. The offset at one end is fastened to the brick wall by means of expansion bolts, while the other end is fastened to the floor and braced at the top by means of a 1½-in. x ¼-in. steel bar. It is painted black and gives a very neat appearance to the shop as well as being an efficient means of preventing materials and equipment being piled against the fire door.

## Paving Old Track in Private Right-of-Way

UNTIL recently the tracks of the Boston Elevated Railway on Bright Road, Belmont, were in a reserved strip in the center of the roadway. A short time ago, however, it was desired by the municipality to pave the street, including the track area. The existing construction of the railway was with 70-lb. T-rail with bolted joints. Wood ties and rock ballast were used. The track structure was in good shape and it was felt that it was unnecessary to take it up or rebuild it when paving the streets. For this reason the company simply retamped the ballast and tightened up the joints. The latter was accomplished by driving wedges between the rail end and spot welding them in position.

Concrete was then poured inside and outside of the rail right up to the level of the rail head. Flangeways were made by means of an arch-shaped wooden form placed between the rails while the concrete was soft and moved lengthwise of the track. In this way the desire of the municipality to have the entire street paved was accomplished without the necessity of expensive track reconstruction by the railway.



Laying a Concrete Pavement Along Tracks Which Used to Be on Private Right-of-Way

## Jack for Brake Cylinder Mounting

BY R. S. NEAL
Assistant Superintendent of Equipment
Kansas City Railways

WHEN it is desired to change the brake cylinder on a car for any reason such as repairing or overhauling of the old cylinder, these



Brake Cylinders Are Mounted or Removed Conveniently and Safely by Means of This Simple Device Constructed in the Shops of the Kansas City Railways

heavy castings are found to be hard for even two men to handle. Even then it becomes necessary to block the cylinder up into place while it is being fastened to its supports. All this takes considerable time, makes it a difficult physical task, and in addition introduces an accident hazard.

In the shops of the Kansas City Railways a simple and inexpensive jack has been designed and constructed for holding brake cylinders in position while they are being either removed or replaced on a car.

This jack is shown in the accompanying illustration. It is simply a trestle with a false top which can be either raised or lowered by means

of an ordinary car jack. The false top is guided in its movement by strap-iron guides on the ends.

The 10-in. and 12-in. brake cylinders which are being installed on all cars of the Kansas City Railways weigh 200 lb. and 300 lb. respectively, and this jack has been found to be very convenient for the use of workmen when installing these cylinders.

## Armature Tongs Speed Up Handling

MANY methods and devices have been developed in various railway shops for handling armatures from place to place. The specially designed pair of tongs which was developed by the mechanical department of the Twin City Rapid Transit Company has proved to be an unusually efficient tool for this purpose.




These Tongs Have Proved Very Useful for Handling Armatures About the Twin City Rapid Transit Company's Shop

These tongs are arranged so that they are simply dropped over the armature, and when raised by the two short lengths of chain and the ring above grasp the armature securely between the two curved jaws.

It is evident that an armature can be picked up from any position on the floor by means of this device, without the necessity of passing a band under the core, as is the customary method. When the armature is to be placed down on a bench or in a machine, the tongs are released as soon as they are relieved of the weight.

In order to keep the jaws open when the tongs are suspended without a load, a small hook is provided on the suspension ring shown at the ends of the two short sections of chain. This hook drops under the center joint and holds the jaws apart until the operator is ready to pick up an armature. By this arrangement the tongs are readily manipulated on a hoist or crane by one man, when moving armatures from place to place in the shop.

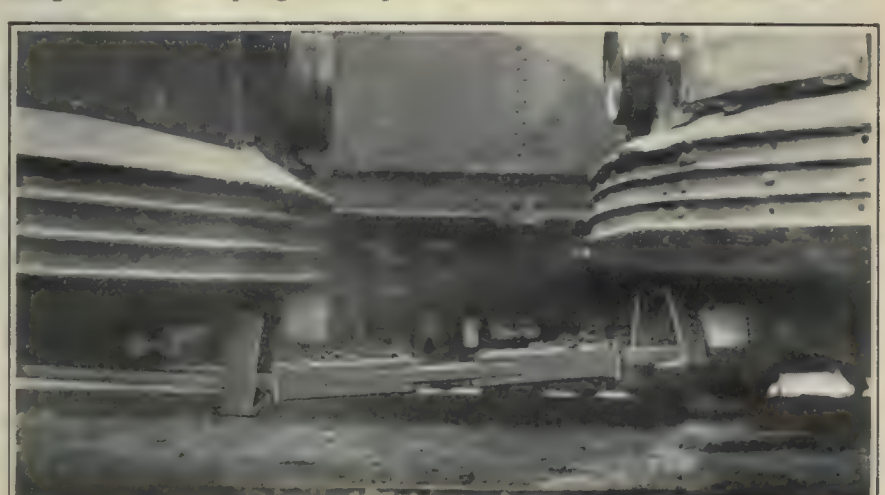


At Left, Old Coupling Head Which Protruded Beyond the End of the Car. At Right, the New Coupling Bar Does Not Extend Beyond the Bumper

## Coupling Modification Reduces Accident Hazard

WHEN a change in the laws of the state of Massachusetts permitted the Eastern Massachusetts Street Railway to remove the old-fashioned fenders from its cars the change left the coupling heads protruding at the ends of the car in a way that was not only unsightly but also dangerous. A number of accidents occurred on account of these protruding couplings striking pedestrians on the street. To eliminate this danger the railway decided to remove the shackling blocks and use a shortened coupling bar which is entirely underneath the car platform, as shown in an accompanying illustration.

Each car carries two old coupling heads permanently held together by a short bar. They are loosely connected to allow freedom of movement. Cars are coupled by putting this piece between the two drawbars and dropping pins in place to take the tension. Two cars thus coupled are shown in one of the illustrations.



Coupler Composed of Two Coupling Heads and a Bar in Position Between Two Cars

# New Equipment Available

## Electric Treadle-Controlled Doors

TO MEET the demand for automatic control of exit doors by use of a treadle, the Consolidated Car Heating Company, Albany, N.Y., has developed a mechanism for controlling the operation of the door engines electrically. Standard electro-pneumatic control features have been applied to the treadle, the construction of which is greatly simplified through use of electro-magnetic valves. With this construction the treadle pan can be made very shallow, so that it can be set in a platform with the ordinary type of flooring construction without the need for extensive modifications.



Depressing the Treadle Automatically Opens the Exit Doors, Which Continue Open Until the Passenger Is Off the Step

In regular operation the treadle pan is held in its raised position level with the platform floor by springs. A passenger stepping onto the treadle presses it and forces the plunger of the electric door switch down so as to make contact; this energizes the magnet valve, admitting air to the door engine, so as to open the doors and lower the steps. The lowering of the step actuates another electric control switch, which closes a circuit in parallel with the magnet valve. The doors will then remain open as long as the step is held in its lowered position, even though weight is removed from the treadle, so it returns to its normal position. As soon as the passenger leaves the step, this is raised slightly by spring pressure and the electric switch opens the door engine circuit, so that the doors are closed and the step is raised. The closing motion is delayed sufficiently so that after the passenger has left the step there is plenty of time for him to get clear of the car before the door starts to close.

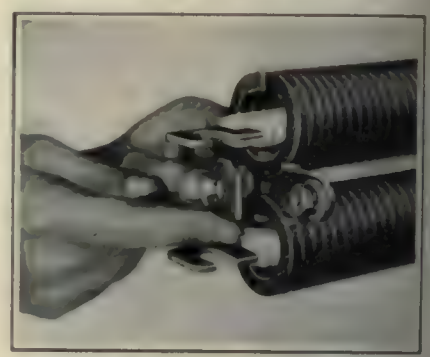
The accompanying illustration shows the treadle mechanism on a one-man, two-man car. In this case, the pair of folding doors next to the car body is used for exit. With one-man operation the treadle mechanism provides automatic control of the exit doors, while with two-man operation, both the entrance and exit doors are controlled by the conductor from his operating station.

## Edgewound Resistor

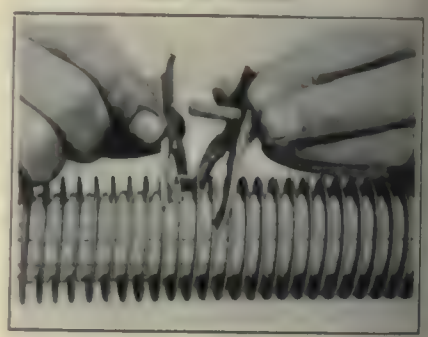
A RIBBON-TYPE resistor, wound on edge, has recently been developed by the Monitor Controller Company, Baltimore, Md. The resistor unit consists of a high-resistance alloy ribbon wound in helical form and mounted on a steel-reinforced porcelain support which passes through the unit. This method of construction relieves the resistor ribbon from mechanical strain and permits of thorough ventilation. The ribbon can operate at any temperature up to red heat without sagging.

A system of terminals and taps enables a unit to be connected into a circuit and to be interconnected with other units. Two simple forms of clamps are provided. One is a bridging clamp which makes mechanical connection between two adjacent units and serves as a terminal when the units are connected in parallel. The other may be used as a terminal clamp or as a tap.

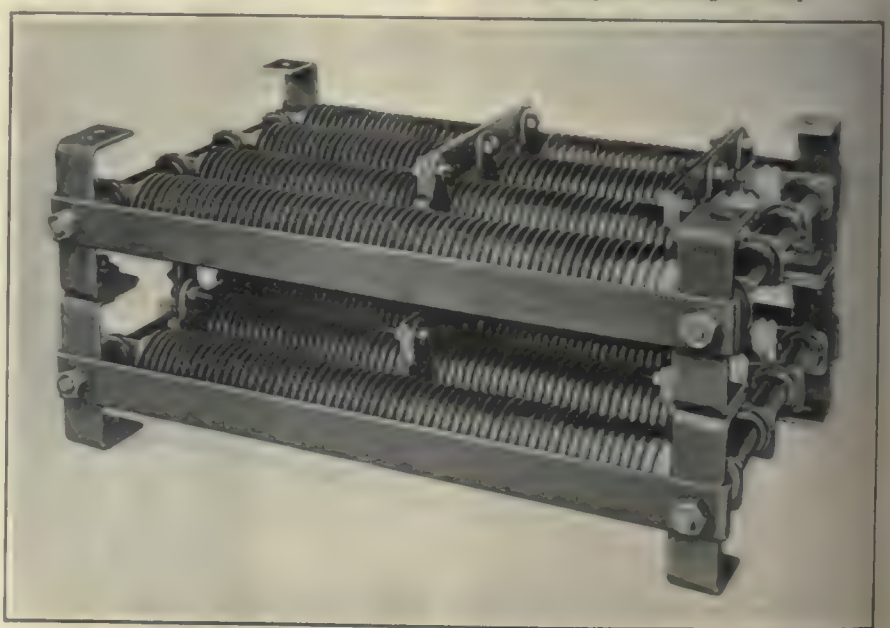
Monitor edgewound resistors are made in standard units and mounted in frames so that they can be employed like the usual cast-iron grids for use with car motors or wherever heavy currents are handled.



Clamp for Connecting Adjacent Units Serves as Terminal When Units Are in Parallel



Clamp for Taking Off Tap



Bank of Eight Units with Standard Method of Mounting

# The News of the Industry

## Favorable Move at Chicago

### City and Companies Appear Now to Be Closer to Agreement on Some Points

The city of Chicago has receded from its previous position and has arranged to get a list of disinterested engineers to evaluate the surface lines, and possibly the elevated lines, with a view to purchase at the valuation price. The city did not commit itself to a deal, but the bankers went on record as recommending to traction security holders the acceptance of the city's notes, known as Schwartz certificates, in exchange for traction securities should the city buy.

Frank O. Wetmore of the First National Bank, who attended the semi-public traction conference of Dec. 2, stated to the committee of Aldermen that the bankers could not sanction a recession from the capital account value of the surface lines of $162,000,000, unless experts appraised the lines at less. With him were John J. Mitchell of the Illinois Merchants' Bank and Melvin A. Traylor of the First Trust & Savings Bank. Leonard A. Busby, head of the south side lines of the Chicago Surface Lines, also was present.

The city had offered slightly more than $142,000,000 prior to the conference. The appraisal was consented to with the provision that if agreement was made for a sale, the price should not exceed $162,000,000 regardless of any excess in the evaluation. This the bankers said was satisfactory. Alderman Fick was ordered to get city and traction lawyers together to agree on three engineers from a list submitted by R. F. Kelker, Jr., city traction expert.

Mr. Busby declared a satisfactory valuation could be arrived at within six weeks from a list containing every item of surface lines equipment which is on the records of the Board of Supervising Engineers. The city, however, agreed to stand the expense of an appraisal.

Six public hearings beginning Dec. 5 were ordered with a view to getting the demands of each section of the city on record regarding the transportation facilities afforded each of the six zones in the city's traction plan.

## Wages Cut in Bloomington, Decatur and Danville

Simultaneously with the wage reduction in Peoria, Ill., from a maximum of 57 cents an hour to 50 cents the wages in Bloomington, Decatur and Danville, Ill., were reduced a proportional amount. As these wage scales are based on the Peoria scale, the high rate in Bloomington was lowered from 50 cents to 47 cents and in Danville and Decatur from 51 to 49 cents an hour.

As explained in the ELECTRIC RAILWAY JOURNAL for Sept. 21, page 461, with the expiration of the contract between the Illinois Power & Light Corporation and the railway men in Peoria on May 1, the company entered into negotiations with the men for a new agreement. After conferences between the local manager at Peoria and a committee of employees, at which a satisfactory wage scale could not be agreed upon, it was decided to submit the question to an arbitration board of three members for decision. It required 90 days before the arbitrator for the company and the one for the men could agree upon the third member. Following another period of 30 days, during which time every phase of a "living" wage was considered, the board recommended a reduced wage scale. This recommendation was set for hearing on Sept. 15 and the wage reduction adopted as of Oct. 1. The new wage scale was not made retroactive to May 1, the time of expiration of the contract, but took effect on Oct. 1. During the period of negotiation and arbitration the railway men received the former rate of pay. The new agreement expires on May 1, 1925.

## Investigator Becomes the Investigated

### Tables Turned on Mayor Hylan, New York, Who Sought Partisan Arraignment of Commission—Grave Political Consequences Are Seen Ahead

TONGUES have been set to wagging again in New York over the transit situation. More traction letters are being written and they are attracting more attention than did the previous correspondence, that between Mayor Hylan and G. M. Dahl, chairman of the board of the Brooklyn-Manhattan Transit Corporation. It is not a matter of the vivacity of the correspondence, but rather the personalities of the participants and the seeming deep significance of the possible future political aspects of the matter. The participants are Mayor Hylan and Governor Smith.

In this connection a little local history may not be amiss for the especial benefit of those outside of New York not acquainted with the recent local political events. Governor Smith, a Democrat, was recently reelected to office by a big vote. He was the only one of his party on the State ticket so put into office. Back of him are a Republican Assembly and a Republican Senate. Mayor Hylan, a political anachronism and a Hearst partisan, gunning for the scalps of the members of the New York Transit Commission, filed charges with the Governor against the commission alleging dereliction of duty and misconduct in office. He demanded that the commissioners be removed from office. It was really a pre-election backfire which the Mayor started.

Mark the celerity with which the removals might be accomplished—if the Governor was willing! There's the rub. All the Governor had to do or all that Hylan undoubtedly thought he would do would be to constitute himself a judge, summon the commissioners before him, question them and then if he saw fit dismiss them. The Governor pondered the matter for two weeks. At least, he didn't reply to the Mayor for that period. When he did, the answer he gave was one that startled the Mayor and set all New York to talking. Instead of following the procedure demanded by the Mayor the Governor named Justice McAvoy, another Democrat, as special commissioner to sit as referee with almost unlimited powers and "report the actual facts regarding the transit situation." He indicated that with that information before him he would determine how to proceed. That flabbergasted the Mayor. He then threatened not to play. More of that later. In naming Justice McAvoy, the Governor said:

> The transit problem in New York City has become a matter of sharp controversy between the city administration and the Transit Commission. Charges against the commission have been made by the Board of Estimate and filed with me. Other charges against the city administration made by the Transit Commission have appeared in the public press. The problem is acute. The present intolerable conditions must be remedied at the earliest possible moment. The people must have the facts.

It appears, according to Mr. Hylan, that the Governor completely misunderstood him. He says that neither he nor the Board of Estimate has requested "an investigation of anything." They are "substantial, formal charges" against the commission that the Mayor has filed. He has said so himself. Of them a trial was requested. At the end of a letter which took almost two solid columns of newspaper space, the Mayor says the Smith plan "neither has my approval nor will it have my participation, save to the extent required by law." He pretends to see ahead "an investigation from which nothing can come except reports and no decision." He wants in place of the present transit commissioners, of whom two are Democrats and one a Republican, "a commission free from present or former railroad or utility affiliation." He concluded:

> When news of your appointment of Judge McAvoy first came to me I assumed that he was named to hear and try the charges and I welcomed such appointment. I now understand from your reported statement that such is not the fact and he is only an investigator, and apparently I misapprehended the scope of the appointment.

Governor Smith was quick to reply. Best of all he did so in just 176 words.

The kick is all in the last 35 words. To the Governor it was quite clear that "the welfare of the people requires complete investigation to ascertain and report all the facts." Then came the 35 words, deeply significant in their portent. Arranged as the Governor put them they follow:

> I am confident that upon reconsideration you will change your decision to participate in the investigation only to the extent required by law and conclude to co-operate with Justice McAvoy fully in the public interest.

On Dec. 5 the Mayor declared that he still believed that a general inquiry by a Moreland act Commissioner was not the proper procedure and that the proper way would have been to proceed under the Public Service Commission act so that proof of the charges against the commissioners might have been presented properly.

It is expected that Judge McAvoy will begin the inquiry as quickly as possible. It was said that he probably would begin to hold public hearings for the taking of testimony in the Aldermanic Chamber at City Hall immediately after the adjournment of the Appellate Division for the holiday period and would continue the hearings through the holidays.

As for the Transit Commission it is reported to be ready and waiting to lay all the cards on the table before an impartial judge. Big doings and more interesting reading about the seven years of delay during the Hylan hierarchy appear to be ahead.

George Van Slyke, who writes politics for the *Sun* and is regarded as being unusually well informed on his specialty, said in the *Sun* for Dec. 3 that Mayor Hylan by his repudiation of the transit investigation by the Governor "has brought Tammany Hall to the verge of the greatest political warfare New York has experienced since the historic battle between Charles F. Murphy and Mayor McClellan 20 years ago." Mr. Van Slyke said in part:

> The Hylan bolt has shaken Tammany Hall from cellar to attic, but the leaders appear to be standing together today in their demand that Smith go through with the investigation regardless of the outcome. Not the slightest doubt was entertained anywhere that such a clash could mean only a knockdown fight between the Smith-Tammany and the Hylan-Hearst factions.
>
> The Mayor will not risk losing his pet issue by submitting it to the test of an impartial investigation. His plan of action is made clear. He seeks to buttress his position by ousting the Transit Commission, getting control of a new commission and putting through his own scheme of transit with a city owned and operated line and extensive bus routes.
>
> The Mayor is fighting with his back to the wall. He is desperate, and even his political enemies are crediting him with displaying real courage in risking an open fight with Tammany on uneven terms. Should the split come it will mean the alignment of Tammany Hall and its allies in the several boroughs on the Governor's side, and Hearst, Copeland and a remnant of the Democratic organization in Brooklyn, Queens and Richmond on the Mayor's. The test would come probably in the primaries, when Hylan would appear for renomination against a candidate picked by Smith and Tammany.

## Hearings on New York Central's Electrification Projects

The Public Service Commission of New York has fixed Dec. 15 for a hearing on the application of the New York Central Railroad for approval of equipment and location to bring about the necessary electrification of its road other than the west side tracks, in New York City, as required by the Kaufman law of 1923. The hearing will take place at 30 Church Street.

Proceedings for the electrification of the company's freight lines on the west side of New York are now under way before the commission, which has authority over changes which may be necessary to street grades in New York City prior to the approval by the commission of the electrification plans.

The hearings scheduled for Dec. 15 are on the proposed electrification of the Putnam division of the New York Central, from Sedgwick Avenue, the Bronx, to Getty Square, Yonkers, and the Port Morris branch on the Harlem division.

On Dec. 16, at 30 Church Street, New York City, the commission will conduct a hearing on the petition of the New York Connecting Railroad Company for the electrification of its tracks within the city of New York from Bowery Bay Junction on Long Island to Fresh Pond Junction.

## Madison Railways Must Have More Income for Improvements

Dudley Montgomery, vice-president of the Madison Railways, Madison, Wis., at a recent meeting in the office of the Railroad Commission made it clear that more income must be derived in order to carry out the program of improvements, and that the only source of revenue was the street car fare. The prospective improvements were outlined in the ELECTRIC RAILWAY JOURNAL, issue of Oct. 25, 1924. Company officials declared that they had not decided on any fixed increase in fares, but all were satisfied that the recent audit of its books made by Harry H. Wilson, accountant of the commission, confirmed the need for more income to insure further development of the system.

Officials of the company volunteered the information that the employees had not been fairly treated on the wage question during the past 10 years, not because the company did not realize that they were entitled to higher pay but that with the present income it was impossible to pay any more. Several years ago the men accepted a reduction of 3 cents an hour after it had been explained to them that a cut was necessary if the system was to be kept in operation. Officials of the company are now anxious to grant an increase to the men. The average salary paid to the employees is $135 a month. Men are not paid for their days off and they are not allowed vacations with pay.

To carry out the physical improvements called for in the plan would cost approximately $700,000. The program is to be spread over a period of 7 years and the major portion of the expense is to come out of the company's revenues. The audit of the railroad commission for the year ended Aug. 31 last showed a net income of $36,934 before providing for depreciation. A large amount of the net income must be used to pay off loans which have been made in order to carry on improvement work, and according to the company officials practically only $7,000 would be left for the program as outlined.

Various types of fares were discussed at the meeting. Officials of the company informed the committee that three-fifths of the income of the company was derived from cash fares and two-fifths from the sale of tickets. The company now sells nine tickets for 50 cents. The cash fare is 6 cents.

## Foreign Bus Lines Entering Detroit to Be Regulated

Action is to be taken by the city of Detroit to regulate the increasing number of bus lines entering the city. Steps looking toward this end were first advocated by John W. Reid, Commissioner of Public Works. Interest in the matter on the part of city officials was aroused by the announcement that the Detroit United Railway would transfer interurban passengers at the city limits to buses which will be operated to downtown Detroit in place of the interurban cars. The idea of the railway is that the buses can make better time inside the city than can the interurbans. A hearing is to be held on the matter.

The D. U. R. already operates a bus line from its downtown station to Trenton and several bus lines are operated from points downtown to suburban cities. Temporary revocable permits were issued to these operators by the Detroit Police Department. It is the opinion of John C. Lodge, president of the City Council, that the city must regulate these buses and be properly compensated for the use of the pavements.

The withdrawal of the D. U. R.'s interurban cars from the city will result in a loss of revenue to the Street Railway Department as the railway now pays the City Department rental for the use of the municipal tracks. It is proposed by Mr. Lodge that a tax be considered by the Council, similar to the one required from companies operating buses within the city. One cent per bus mile is collected by the city from the Detroit Motor Bus Company. This tax is considered as part compensation for the wear and tear on the city pavements. It is levied against other bus companies operating in the city.

The fixing of routes for the buses is also to be considered.

## Accidents Reported

No fewer than four accidents have been reported within the past few days from various parts of the country. On Nov. 30 six persons were injured in a fire in a one-man car of the Public Service Railway at Kearny, N. J. The following day 18 persons were hurt when a bus of the same company was overturned through the recklessness of the driver of a private automobile. On Dec. 4, as a result of a collision between a one-car train of the Sacramento Short Line and a three-car Key Route System train in Oakland, six persons are reported dead and seven probably fatally injured. The day before that five people were burned to death in a fire which followed a collision between a two-car interurban train and a motor truck in Wyandotte, Mich., the truck being loaded with turpentine which took fire.

## Jitney Candidate Defeated at Springfield

Fordis C. Parker, Republican, was ected Mayor of Springfield, Mass., on ec. 2 by 925 votes over Robert W. ing, Democrat, with Josiah Dearborn, ndependent, and Richard J. Talbot, tney candidate, weakly trailing. The ote was as follows: Parker, 9,691; ing, 8,766; Dearborn, 3,780; Talbot, 583. It was an exciting contest, and arker's victory was clinched only by he last three precincts reporting. The ote, 26,935, nearly doubled that of any receding city election. Mr. King, a oung lawyer, made a most remarkable id for the office.

The election is of special interest be- ause all four candidates had com- itted themselves on the transporta- on subject, particularly with respect the future place of the bus in the ty. As a matter of fact, one of the ndidates, as explained in the ELEC- RIC RAILWAY JOURNAL for Nov. 15, ge 857, is counsel for the jitney men led out of Springfield last May by layor Leonard.

Mr. Parker, the successful candidate, kes the stand that the first duty of he city is toward the street railway. revious to his nomination he said that he were elected it was his idea to ppoint an expert to look into the ransportation situation, but that he ould favor a return of the jitneys nly if it were shown that the Spring- eld Street Railway did not appear dis- osed to do all it could to furnish such ervice.

## Co-ordination Talk Continued in Chicago

Universal transfer negotiations are oing forward between the Chicago urface Lines and the elevated roads. amuel Insull, chairman of the board f the Chicago Rapid Transit Company, nnounced this fact to the City Council ommittee on local transportation. ike Henry A. Blair, head of the Sur- ace Lines, Mr. Insull has submitted imself to questioning in an effort to elp the city frame a traction policy.

Mr. Insull joined in Mr. Blair's con- ention that co-ordination of the lines necessary, but he differed from Mr. lair as to the extent. The universal ransfer negotiations are a definite step oward his idea of co-ordination. It expected the companies will soon nnounce whether they can make the lan practicable from a financial stand- oint.

The scheme embraces 136 points here passengers would be permitted o transfer between elevated trains and urface cars. Whether this can be ac- omplished with a single fare or whether a transfer charge or a higher ate of fare would be necessary are oints for the experts to determine.

Mr. Insull took occasion to rebuke he city for not acting on his request or authority to build $23,000,000 of ex- ensions in outlying and crosstown dis- ricts and to lengthen platforms in the oop district so as to accommodate 8-car rains. He said he had ordered 100 ubway-type cars costing $2,300,000 for elivery next fall. This will permit a 5 per cent increase in loop service.

If the city builds a subway, Mr. Insull will increase rush-hour service from 1,200 to 2,400 cars an hour. He said private companies will give the city all the transportation it needs if the city will cease its dilatory consideration of petitions. As to city ownership of lines, he said: "Take away the incentive for profit and you lose efficiency."

It was Mr. Insull's first appearance in seven years before a body of this kind and he did not lose the opportunity to demand fair treatment from the city. He objected especially to Mayor Dever's reiterated statement that the elevated lines cannot get the money for extensions. Mr. Insull said:

"Credit is like a woman's reputation; a whisper and it's gone. Quit talking and give us the authority and you will get rapid transit enough in a hurry."

## 3,000,000 Messages Distributed in Philadelphia

Three "Read as You Ride" Service Talks were distributed during the week ended Nov. 22 on the cars of the Philadelphia Rapid Transit Company, each for a period of two days. Each approached the 1,000,000 mark in distribution. Dash signs were used in




Dash Sign Used in Philadelphia

calling attention to the message. They were entitled "Better Wages, Better Service," "Your Fare and Others" and "Why No Fare Boxes." In each case the admonition was added: "Ask for Service Talks."

## Railway Preferred to Bus in Eastview, Ont.

The ratepayers of Eastview, Ont., voted on Dec. 1 in favor of granting a franchise to the Ottawa Electric Railway by a majority of 247 over that in favor of granting a franchise to the Eastview Transit Company for the operation of buses. The railway has offered to lay the tracks for a distance of 1¼ miles without cost to the town and to charge a fare of 10 tickets for 25 cents to city limits. It was agreed that if the city of Ottawa at any time purchased the company's lines the town of Eastview would be given the opportunity to purchase at the same terms and for the actual cost of the line within the town limits. The Eastview Transit Company offered to run four buses from ¼ mile east of the town limits to the Ottawa main post office, 2¾ miles, at a 5-cent fare and a 10-cent rate on Sundays. The bus and railway tangle in Eastview has been referred to previously.

## New Agreement in Dallas Expected

The present arrangements between the city of Dallas, Tex., and the Dallas Railway whereby a 6-cent fare is charged in the city will expire on Dec. 27. Unless a new agreement is made and authorized by a city ordinance the fare will automatically return to 5 cents as specified in the city charter. It is expected that an application for a continuance of the 6-cent fare will be filed shortly by the company.

The present 6-cent fare was extended for 18 months from June 27, 1923, on condition that the railway spend $705,915 in extensions, rebuilding and repairs and in the purchase of 30 additional cars during that period. This proposal made by the City Commission is known as the Everman Plan No. 2. The agreement constituted an understanding between the city officials and the traction company and was negotiated by John W. Everman, supervisor of public utilities for the city. At the time the extension was authorized it was agreed that the improvements and extensions would not be required until after the completion of improvements in the Everman Plan No. 1 of 1922, which gave the company eight months for completion of the program.

The railway extensions that may be projected now as a commitment on the part of the company for the increased fare have not been made public, but have been under discussion. When the agreement expires on Dec. 27 the railway is to take over operation of the Trinity Heights line from the Texas Electric Railway under the franchise agreement.

## One-Man Operation Started in Cleveland—Arrests Made

One-man car operation on important lines in Cleveland, Ohio, during non-rush hours was started by the Cleveland Railway on Dec. 1. It was followed immediately by arrests of the operators by authorities in the city of Cleveland, Lakewood and Newburgh Heights, who invoked police ordinances forbidding running of street cars with fewer than two men. During the first two days of operation twelve of the operators were arrested, but the Cleveland Railway insisted that one-man operation would be thoroughly tried. The hearings for those arrested are to be held within the next two weeks. The city ordinances prescribed penalties of fines ranging from $5 to $25 for each violation.

Railway men insist that one-man car operation was started as an economic measure because not sufficient funds are allowed for two-man operation on lines that are losing money. Secretary Wilson said that if operation of one-man cars interfered with or impaired service, they would be discontinued.

An interesting feature of the arrest of the operators lies in the fact that if any of them are fined, the fines will be paid by the railway out of the pockets of the car riders, because under the Cleveland arrangement, any money made by the company over and above the 6 per cent paid to stockholders goes into a fund to reduce or increase fares.

## Aldermen Act Against One-Man Cars in New Haven

Primarily for the purpose, it seems, of determining the extent of the jurisdiction of the city of New Haven, Conn., over the railways operating within its limits, an ordinance to this effect was passed by the Aldermen on the evening of Dec. 1, which would ban the use of one-man cars. Up to Dec. 3 the measure had not been approved by the Mayor. It is pretended that the purpose of the ordinance is "to prevent accidents in the streets of the city and the highway district of New Haven, facilitate traffic therein and preserve good order and secure the safety of persons using the city streets."

In passing the act the Aldermen proceeded on the advice of Assistant Corporation Counsel Thomas R. Robinson.

The intention of the Connecticut Company is to appeal to the State Public Utilities Commission for relief from the terms of the measure if the Mayor signs the ordinance. Its contention is that the city has no such power as it is now seeking to wield.

This is not the first time that a similar issue has been raised in Connecticut. Last January the Council of Hartford passed an ordinance against the use of one-man cars in which the time limit was fixed at July 15. When the expiration date rolled around a resolution was passed giving the company permission to continue one-man cars until it received a month's notice to withdraw them. It was pretended at the time by the city that the ouster measure was involved with a tax measure then pending determination by the courts.

The position of the railway in that case was the same as it has taken in connection with the New Haven matter, namely, that the Public Utilities Commission has jurisdiction.

## Suit to Reduce Nashville Fare Fails

Chancellor John R. Aust recently dismissed the bill filed in Chancery Court by a citizen in which it was sought to enjoin the Nashville Railway & Light Company, Nashville, Tenn., from charging a 7-cent fare. In dismissing the bill the chancellor said that reliance was put solely on a city ordinance which fixed the fare at 5 cents, but no reference had been made to the act of the General Assembly creating the Utility Commission, nor did the complaint raise the question of the validity of that act.

The opinion further stated that the railway rested its defense upon the order of the commission which, after a full hearing, permitted the railway to charge and receive a 7-cent fare; that the commission's order must stand unless the ordinance of the city is superior to the legislative act, or the act is contrary to the constitution of the state or of the United States. Chancellor Aust said that it would be an anomaly if the city could deprive the people from exercising jurisdiction through a legislative body.

He referred to the situation in Memphis, where the order of the commission there permitting a 7-cent fare had the effect of overriding and of superseding an ordinance of that city fixing the fare at 5 cents.

## New Franchise Proposed at St. Louis

A new franchise from the city of St. Louis to cover a period of 50 years is proposed in the interest of the successor company to the United Railways. Mayor Kiel wants the franchise bill to go through as initiated by the people. He apparently doesn't want the responsibility of accepting a franchise for the city. As Mr. Kiel is a tentative candidate for re-election to a fourth term as Mayor his attitude is regarded as most important. The Mayor and fourteen Aldermen come up for re-election in April. Fourteen other Aldermen and President Walter Neun of the board hold over for two more years.

The new franchise will provide for service at cost and a co-ordinated bus and railway line. Provision will also be made for the subway system the city contemplates building. The railway is expected to agree to use the subways on a leasing arrangement, the city to furnish the capital to build them if present plans are consummated. The city is making a survey to ascertain the best means of solving its rapid transit needs. A special aldermanic committee has recommended the expenditure of $100,000,000 for a subway system in the congestion sections of the city.

The city under the new franchise measure would have direct representation on the board of directors of the railway and it is very probable that a plan for a gradual purchase of the system by the city will be worked out.

A special election on the franchise together with the cost of conducting an educational campaign would probably run the bill to $100,000. It is regarded as imperative to vote on the bill on a day different from the one on which officials are elected to public office in order to keep the element of politics out of the election. In any event it would probably be impossible to prepare the franchise measure in time for submission at the Spring election. While the various financial interests have accepted the plan for the reorganization of the railway many steps remain to be taken before the franchise can be acted upon. The present franchises expire in about 15 years.

The program of the reorganization committee provides for full, open and public discussion of all questions involved in the new franchise.

## Bus Fares in Michigan Advanced —Accounting System Likely

The Michigan Public Utilities Commission recently authorized a temporary fare increase of half a cent per passenger-mile on buses operated between Detroit and Pontiac by the Star Motor Coach Company, between Detroit and Mount Clemens by the Wolverine Motor Bus Company and on the electric cars of the Detroit United Railway's Pontiac and Mount Clemens divisions. The new rates went into effect on Dec. 1. They represent half of what the three companies asked in their [illegible] cent petition. It is said that the [illegible] cent mileage rate just instituted was [illegible] makeshift order because of lack of [illegible] dence submitted at the recent hearing. It is expected that the commission will order the bus companies to install a system of accounting more complete with respect to details so as to enable the regulatory body to learn exactly how much loss or profit per passenger mile is being encountered.

Promptly following the decision of the commission fixing the temporary rate of fare the Detroit United Railway announced its plans for the co-ordination of bus and rail service wherever possible. The trolley and bus service between Detroit and Pontiac will be co-ordinated. The rail fare will be a straight fare at the rate allowed, while the bus fare will be in increments of [illegible] cents. The minimum rail fare is [illegible] cents and that on the buses 10 cents. The Detroit United is now charging a cent a mile on its Pontiac and Mount Clemens Division and has a petition before the commission for authority to charge 2 cents a mile.

Elliott G. Stevenson, president of the Detroit United Railway, recently stated in connection with the proposed fare advances for Mount Clemens and Detroit that the business rivalry between the railway and the interban bus lines had led to a service very much in excess of that warranted by the combined volume of business, and at a rate of fare wholly inadequate to meet the costs of doing business. He said that the result had been a severe financial loss to both railway and bus operators. This, he said, had been particularly emphasized in the deterioration of bus equipment, most of which would have to be replaced.

## Philadelphia Rapid Transit to Participate in Terminal Plan

Plans have been made for conference between the Pennsylvania Railroad and Philadelphia Rapid Transit Company officials regarding the inclusion of elevated and other transit lines in the new railroad station. The intention is to remove the road's station to the west bank of the Schuykill. This plan involves the initial expenditure of $40,000,000 by the Pennsylvania Railroad and $12,000,000 by the city.

In this connection the Philadelphia *North American* has revived the story about plans for electrification of the principal divisions of the Pennsylvania Railroad. It says that the work will be started as soon as business conditions develop to a point where the financing of the giant project can be properly handled. It is probable that with the beginning of the work on the proposed new railroad terminal on the west bank of the Schuylkill River the railroad will institute the necessary preparations for the electrification of its lines between New York and Washington and across the Allegheny Mountains. The first step on the New York and Maryland divisions will be the use of electricity between this city and Wilmington, to be followed rapidly by transformation of the line between New York and Bristol.

## Rules Governing Bus Operation Tightened

The Public Service Commission of New York has issued an order providing for certain safety equipment on buses after Jan. 1, 1925. The order reads as follows:

The commission being of the opinion that public safety requires that gas tanks on buses operated on stage routes, bus lines and motor vehicle lines shall be located outside the body of said buses, and that an emergency exit is necessary on certain types of buses, it is

Ordered that no person or corporation owning or operating a stage route, bus line or motor vehicle line under a certificate from this commission, granted pursuant to the provisions of the transportation corporation law shall, on or after Jan. 1, 1925, operate motor buses, unless said buses shall be equipped in accordance with the following requirements:

1. The gasoline tank shall be located entirely outside the body of the bus with an inlet for filling which shall permit filling from the outside exclusively.

2. In those buses having longitudinal seats or a longitudinal aisle between seats, in which there is a common exit and entrance, there shall be provided an emergency exit door located at the opposite end of the bus body from the regularly used entrance and exit, which emergency door shall be securely fastened in a manner which will prevent it being opened except when opened for emergency purposes.

The Public Service Commission has also prepared a set of rules applicable to operators of buses throughout the state of New York. The commission in 1922 required that all persons or corporations operating bus lines should adopt regulations for the guidance of employees, but the new rules of the commission provide for uniformity throughout the state.

Rules have been promulgated by the commission covering every phase of the employees' duty, divided under four general heads—general, personal appearance and conduct, garage rules and operation. Disregard of orders, violation of rules or neglect of duty will always be considered a sufficient cause for dismissal or discipline.

Emphasis is placed on the rule that all buses must be brought to a dead stop before crossing a railroad.

Buses must be operated under a schedule and under no conditions pass schedule points ahead of time; in case of delay operators may not make up lost time by reckless driving.

It is provided that operators before leaving the garage or when relieving another must inspect the motor bus to determine the amount of gasoline in the tank, amount of oil in the engine case, amount of water in the radiator, condition of fare box and tell-tale, condition of service brake, condition of emergency brake, condition of lights, cleanliness of interior of bus, and presence of fire extinguisher. A record of such inspections must be kept on a daily inspection card provided for that purpose. All defects observed must be immediately reported.

Another rule provides that the maximum standing passenger load must not exceed 35 per cent of the seating capacity. Running lights must always be displayed at least 15 minutes before sunset and at such other times as existing conditions may require. In conclusion the order says:

The safety of the passengers must at all times be the first consideration. Employees must exercise constant care to prevent injury to persons and property and in all cases of doubt must take the safe course.

In case of accident injured persons must not be left until arrangements have been made for proper care, and verbal and written reports of every accident must be made by the operator.

Copies of these rules will be mailed to all bus lines as soon as printed.

## Subway Draft Under Way in Philadelphia

City Solicitor Gaffney of Philadelphia announced on Dec. 1 that the draft of an agreement between the city and the Philadelphia Rapid Transit Company for the building of the Broad Street subway would be submitted to the Mayor's Transit Commission before the Christmas holidays. It was made clear that under the terms of the loan bill through which funds for both projects were made available, $10,000,000 is definitely set aside for the Chestnut Street subway, while $67,000,000 is just as specifically allocated to the Broad Street line.

In the proposition submitted to the city several weeks ago by railway officials the company undertook to pay the interest and sinking-fund charges on a $50,000,000 50-year loan for the construction of the Chestnut Street subway. If work were begun at once, it was pointed out, the tube would be completed and ready for operation sooner, perhaps, than the Broad Street subway, which is scheduled to open late in 1928.

The proposition was placed in the hands of the Transit Commission by the Mayor and in turn the City Solicitor, the Transit Director, and Mr. Swaab were delegated to consider the drafting of an agreement which the city might present to the company.

## Engineers Expected to Report Soon in Los Angeles

The comprehensive report of Major R. F. Kelker, Jr., outlining a complete rapid transit system for metropolitan Los Angeles, is scheduled to be filed with the Board of Public Utilities about Jan. 1. It is also expected that about the same time the board and the State Railroad Commission will receive the report of Richard Sachse and Chief Engineer J. O. Marsh, covering the proposed merger of the electric lines. A statement made by one of the commissioners said:

Major Kelker's report will embody a practical working plan under which there will be no need of waiting for the city to vote a $100,000,000 bond issue in order to carry out the program. A rapid transit system will be recommended which can be established in units, and a financial program will be submitted so the city can begin at once on the system as soon as the plans have been approved by the proper authorities.

The report of the special engineering committee will recommend the formation of a holding company to operate the two lines until municipal ownership is an accomplished fact. If this is not found practical at the earliest possible moment, both Engineer Sachse and his associates are said to favor the purchase of the Pacific Electric metropolitan lines by the Los Angeles Railway.

## Sixty-three Buses Wanted by Kansas City Receivers

The receivers of the Kansas City Railways, Kansas City, Mo., favor the purchase of 40 single-deck, 18 double-deck and 5 de luxe buses for use in service supplementary to the railway lines. Action to this effect was recommended in a report filed on Nov. 29 with Judge Kimbrough Stone. Judge Stone is asked to permit the purchase and service providing the railway obtains protection against bus competition from the city administration.

The report to Judge Stone is signed by Francis M. Wilson and Fred W. Fleming, the receivers. Its presentation follows a series of public hearings. Ten routes are recommended as follows:

Four main lines in Kansas City, Mo.
One parlor car line in Kansas City, Mo.
Three cross-town, or feeder, lines in Kansas City, Mo.
Two cross-town, or feeder lines in Kansas City, Kans.

A 10-cent fare would be charged on all lines except the parlor car line, on which a 25-cent fare would be required.

Transfers from cross-town lines to street cars would be permitted. Transfers from street cars to cross-town lines would be permitted with the payment of an additional 3-cent fare. No transfers to or from main line buses would be permitted.

Judge Stone has instructed the receivers to negotiate at once with the city to secure franchises that would protect its proposed investment in buses. When these reach a point where the court considers such an order justified it is expected that the receivers will be instructed to buy buses and begin service.

**Will Suspend Auto Parking Agitation.**—The subject of the degree at which automobiles shall be parked in the business district of Oklahoma City, Okla., is to be allowed to rest indefinitely, according to announcement of the Retailers' Association after a conference with John W. Shartel, president of the Oklahoma Railway. The merchants prefer 45-deg. parking as it permits more automobiles to park in the business district. The company prefers parallel parking as it reduces automobile monopoly of the company's rails to a minimum. The rule at present in effect is for 20-deg. parking, which Mr. Shartel says is a very substantial benefit to the company and the public using its cars, traffic having been speeded up materially and accidents substantially reduced in number since this rule became effective.

**Jitney Lines Attacked.**—Citation has been issued by the Alabama Public Service Commission, naming as respondents 32 individuals in Huntsville, and four bus and taxi lines in Gadsden, Attalla and Alabama City, requiring them to show cause why they should not be required to discontinue operation of jitney service for alleged failure to comply with the laws of the state. Under the Alabama law, when a jitney or motor vehicle is operated in competition with a railway, application to operate such jitney must be made to the Alabama Public Service Commission for a certificate of convenience and necessity.

**Nine-Cent Fare in Effect.**—The Des Moines City Railway, Des Moines, Iowa, instituted a 9-cent cash fare with a ticket rate of 8.5 cents Nov. 30. The rate for children, school children and owl car service is unchanged. F. C. Chambers, general manager of the company, reported that the stabilizing fund of the company, which was to be maintained at $150,000, had not only fallen below the $100,000 mark, which automatically brought a fare readjustment, but that it had been depleted, and that to meet operating expenses, fixed charges and taxes a loan of $25,459 had been incurred.

**Acquires Bus Lines.**—The Columbus, Newark & Zanesville Electric Railway, Springfield, Ohio, has acquired the bus lines operating in the city of Newark for $40,000 and will continue their operation with new equipment and universal transfer privileges on a 6-cent fare. The City Council recently passed an ordinance granting a 25-year franchise to the company. It was vetoed by the Mayor and passed over his veto on Nov. 17.

**Bus Operation for Lockport.**—The International Railway and its subsidiary, the International Bus Corporation of Buffalo, N. Y., have informed the City Council of Lockport that they will apply for a franchise to operate buses in Lockport as part of a new interurban bus line service from Buffalo, Lockport and Olcott Beach. A committee has been appointed by the Lockport Mayor and Board of Commerce to confer with President Tulley of the railway on the proposed bus line.

**Granted Fare Increase.**—Fare charged by the Chickasha Street Railway, Chickasha, Okla., was increased from 7 cents to 8 cent effective Dec. 1 in accordance with permission granted by the State Corporation Commission following a hearing Nov. 26. The application for the increase was not opposed, the company's request having been indorsed by the Chamber of Commerce and the City Council. The Chickasha Gas & Electric Company, cooperating to keep the electric railway operating, has granted a substantial reduction in the price of power to operate the line.

**Seeks Higher Fare.**—The Manchester Street Railway, Manchester, N. H., announced on Nov. 22 that it would seek permission to increase cash fares from 8 to 10 cents. If granted, the increase will become effective Jan. 1. General Manager J. Brodie Smith claims that during the last six months the company has operated at an average loss of $10,710 a month. Ten months of this year, ending Oct. 31, show a loss of 1,093,646 passengers compared to the same period for 1923.

**Will Accept Bus Lines.**—The proposal of the Quincy Street Railway, Quincy, Ill., to substitute bus lines on State and South Eighth Streets for the car tracks will be accepted by the municipal authorities as a solution of the repaving problem which has been in contention between the traction line and the city. The railway has 3 miles of track on South Eighth and State Streets and to tear up the present lines, relay and repave would cost $120,000. The company, however, has agreed to pave between its tracks on lines on Chestnut Street from Eighteenth Street to Twenty-eighth Street. Ralph F. Carley, western division manager for the Illinois Light & Power Company, represented the public utilities in the conferences.

**Ordinance Against One-Man Cars Unlawful.**—Efforts on the part of the City Council of Buffalo to prohibit the operation of one-man cars on local lines of the International Railway are opposed by the city law department, which has handed down a decision saying such an ordinance would be unlawful. It was proposed to provide a penalty for violation of the proposed ordinance of fines of $100 to $250 for each offense. A ruling by the Public Service Commission on the operation of one-man cars in Buffalo is expected within the next week.

**Alton Company Seeks Franchise.**—The Alton, Granite City & St. Louis Traction Company, which charges a city fare of 10 cents in Alton, Ill., has proposed to the Alton City Council a reduction in fare in return for a 20-year franchise to operate on Broadway, Alton. The Broadway line has been operating without a franchise for some time. The Council has passed several new franchise bills which the company has declined to accept because of the special taxation provisions of the measures. The franchise proposal was made in the name of the receiver of the railway.

**New Company to Operate Buses.**—The Spartanburg Bus Company, a subsidiary of the South Carolina Gas & Electric Company, Spartanburg, S. C., has been granted a charter. Officers of the company are, R. L. Peterman, general manager of the Barstow interests in South Carolina; vice-president, J. H. Axtell, assistant general manager of the South Carolina Gas & Electric Company, and secretary and treasurer, A. S. Jolly, treasurer of the South Carolina Gas & Electric Company. The company is to be financed by the W. S. Barstow Management Association.

**Will Operate One Man Cars.**—Directors of the Fitchburg & Leominster Street Railway have decided to put one-man cars into operation on the company's line between Fitchburg and Ayer, Mass. President Wesley W. Sargent in disclosing the plan said the change was made to economize during the winter when traffic was light. The change will mean a considerable cut in expenses. This is the fifth line of the company to change two-man to one-man type of car.

**Fight for Lower Rates.**—The beach cities served by the Pacific Electric Railway have started action to bring about the improvement of interurban railway service from Los Angeles to Redondo, Venice, Ocean Park, Santa Monica and Alhambra. The cities at the same time demand a tariff reduction of approximately 40 per cent. A committee of fifteen has been appointed composed of representatives from all the cities affected. The petition, it is expected, will be filed with the State Railroad Commission by the end of this month.

# Foreign News

## Mexican Railway Being Electrifie

Electrification of the branch line o the Mexican Railway between Es peranza, Puebla and Orizaba, Ver Cruz, a distance of 29 miles, is now i progress. The contract was secured b an American company, but the actua construction work is being done by th Mexican Railway under the supervisio of American electrical engineers. Th work is up-grade from 4.7 to 5.25 pe cent.

The overhead construction will co approximately $250,000; the substatio $250,000, and 10 electric locomotive $1,250,000. The substation will b equipped to convert a 42,000-volt, 6 cycle, three-phase, high-tension alte nating current into a 3,000-volt dire current. Power will be furnished b the Puebla Electric & Power Company Tuxpan.

---

**New Electric Railway for Guatemal** —A contract for construction of a electric railway from Santa Maria t Quezaltenango, Guatemala, and power plant at Santa Maria has bee signed by the Secretary of Finance an Public Credit of Guatemala. The wor will be done by the Allgemeine Elek tricitäts Gesellschaft of Berlin. Bond to the value of $3,000,000 will be issue by the government to finance the wor

**Croydon Tramways to Be Reorgan ized.**—Croydon Town Council, England is planning to reorganize the municipa tramway system, in an effort to mee bus competition. Being only a fe miles from London, the Croydon tram ways are subject to severe competitio of buses owned by private companie Bids have been asked for 30 additiona street cars.

**Speed of London Tramcars.**—Th average speed of the London Count Council tramways is 9¼ m.p.h., includ ing stops, according to a report mad at a recent meeting of the Counci This is said to be the highest averag speed on any street lines in Great Bri tain, comparing with 7.57 m.p.h. i Glasgow, 8.5 in Birmingham, 7.87 i Manchester and 8 in Liverpool.

**London Officer Resigns.**—Ivor Fraser publicity manager of London under ground electric railway companies, ha resigned that office in order to becom manager of the *Morning Post*, London A. L. Barber, commercial manager t the companies, will for the time carr on also the duties of publicity manager

**Equipment Contract Let for Au tralian Electrification.**—A contract ha been secured by the Metropolitan Vickers Electrical Company, Manches ter, England, to furnish electrica equipment for 150 motor coaches an 150 trail cars to be used on the Sydney Australia, suburban railways which ar being electrified. The price is abou £500 000. The equipment for eac motor coach includes two 350-hp., 1,500 volt motors with electro-pneumati control. The overhead contact syster will be employed.

# Financial and Corporate

## $3,986,059 Net in Brooklyn

### First Annual Statement of Successor to Brooklyn Rapid Transit Reflects Great Increase in Traffic

A net income of $3,986,059 is shown in the first annual report of the Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y., for the year ended June 30, 1924. This is after the deduction of interest, rentals and accruals to minority interest. After allowing for preferred stock dividends paid during the year the company earned $3.23 a share on the 769,911 shares of no par common stock. The consolidated statement shows that there were paid for the fiscal year ending June 30, 1924, two quarterly dividends on the outstanding preferred stock of the Brooklyn-Manhattan Transit Corporation, aggregating $748,404. No other dividends were paid on the B.-M. T. stock nor any dividends declared by any of the operating companies during the fiscal year. The figures in the consolidated statement include the result of operation of the Brooklyn Heights Railroad, still in receivership.

The report gives a condensed summary of the results of operation under the contract with the city for the year ending June 30, 1924, and also for the seven-year period from the commencement of the contract, namely, Aug. 4, 1913, to June 30, 1924. Referring to these figures the report states that they indicate the extent to which, both for the year just closed and the period from the commencement of the contract, the operations of the rapid transit lines under the contract of the city on a five-cent fare have failed to earn the stipulated return of interest and sinking funds of the company's and the city's contribution to the construction and equipment of the new line.

The contract with the city provides that the revenues derived by the company from the operation of the city-built and the company-owned rapid transit lines are to be pooled and from such pooled earnings certain deductions are to be made in the order specified, the balance being divided between the city and the company in equal parts. The contract provides that the company is to receive out of the pooled earnings the stipulated interest and sinking fund on its investment before the deductions are made in favor of the city. The deductions stipulated in the contract are, in condensed form, and in the order of priority, as follows:

(1) Operating deductions, including rentals, taxes, operating expenses, maintenance and depreciation;
(2) The company's first preferential of $3,500,000, representing the average annual income for 1911 and 1912 from the operation of the company-owned rapid transit lines contributed to the pooled system, out of which the company must pay interest on its capital investment in such rapid transit lines;
(3) The company's second preferential of interest and sinking fund on its contribution to the cost of construction and equipment of the new lines and on cost of reconstructing and adding to existing lines;
(4) The city's preferential of interest and sinking fund on its contribution to the cost of constructing the new lines.

Each of these deductions is to be made in the order given and deficits in any period are to be cumulative and paid out of subsequent earnings before any deductions are made on succeeding items.

The relative volume of traffic handled on the rapid transit lines and street surface lines of the company is shown by the number of passengers carried for the year ended June 30, 1924, namely, on the rapid transit lines 539,069,076 and on the street surface lines 266,421,409. The great increase during the past seven years in traffic handled was shown in the report. In 1924 805,490,480 passengers were carried on both the surface and rapid transit lines compared with 520,969,604 in 1918. On the matter of traffic the report states that the problem is that of providing adequate facilities to handle the tremendous increase which is bound to result in the future under the limitations and restrictions imposed under the contract with the city.

In submitting the first annual statement of the company to the stockholders G. M. Dahl, chairman of the board of directors, gives the historical facts in connection with the organization of the property and the contract of the rapid transit lines with the city. He said that the city of New York had $150,000,000 invested in the subway and elevated lines leased to the New York Rapid Transit Corporation, which was controlled through stock ownership by the B.-M. T. He said that the prosperity or adversity of the subway and elevated lines was determined by the earnings of the New York Rapid Transit Corporation and not by the earnings of the Brooklyn-Manhattan Transit Corporation. The latter property has a substantial income from bonds and other indebtedness of the surface line companies owned by the holding company and those earnings contribute to the income of the B.-M. T. During the year ended June 30, 1924, the B.-M. T. owned 188,138 shares of stock of the New York Rapid Transit Corporation. During that same period, the revenues of the New York Rapid Transit Corporation failed by $5,148,948 to meet the annual interest and sinking fund of the company's and the city's investment.

STATEMENT OF EARNINGS AND EXPENSES FOR YEAR ENDED JUNE 30, 1924, BROOKLYN-MANHATTAN TRANSIT SYSTEM AND AFFILIATED COMPANIES

| | |
|---|---|
| Revenue from transportation: | |
| Passenger revenue | $38,376,581 |
| Freight revenue | 650,172 |
| Chartered car revenue | 873 |
| Miscellaneous transportation revenue | 516 |
| Total revenue from transportation | $39,028,144 |
| Other street railway operating revenues: | |
| Advertising | $534,389 |
| Other car and station privileges | 297,475 |
| Rent of buildings and other property | 147,573 |
| Rent of equipment | 170 |
| Rent of tracks and terminals | 22,283 |
| Miscellaneous receipts | 42,289 |
| Total other street railway operating revenues | $1,044,181 |
| Total street railway operating expenses | $40,072,326 |
| Operating expenses: | |
| Maintenance of way and structure | $3,742,677 |
| Maintenance of equipment | 5,671,801 |
| Operation of power plant | 3,428,726 |
| Operation of cars—trainmen's wages | 6,514,423 |
| Operation of cars—other expenses | 3,908,713 |
| Damages | 1,277,771 |
| Legal expenses in connection with damages | 174,478 |
| General law expenses | 105,333 |
| Other general expenses | 1,156,119 |
| Freight expenses | 519,303 |
| American railway traffic company—expenses | 60 |
| Total operating expenses | $26,499,408 |
| Net revenue from operation | $13,572,917 |
| Taxes accrued on operating properties | 2,738,946 |
| Operating income | $10,833,970 |
| Non-operating revenue: | |
| Rents accrued from lease of road | $61,467 |
| Miscellaneous rent revenues | 297,376 |
| Interest revenues | 428,865 |
| Dividend revenues | 61 |
| Profits from operations of others | 12,318 |
| Miscellaneous | 151,366 |
| Total non-operating revenues | $951,456 |
| Non-operating revenue deductions: | |
| Rent expense | $1,000 |
| Net non-operating income | $950,455 |
| Gross income | $11,784,425 |
| Income deductions: | |
| Interest deductions | $7,431,050 |
| Rent for lease of other road and equipment | 25,000 |
| Other deductions | 306,309 |
| Total income deductions | $7,762,360 |
| Balance | $4,022,065 |
| Less accruing to minority interests | 36,006 |
| Net income | $3,986,059 |

OPERATING RESULTS OF RAPID TRANSIT LINES UNDER FIVE-CENT FARE CONTRACT WITH CITY

| | Year Ended June 30, 1924 | Period Aug. 4, 1913, to June 30, 1924 |
|---|---|---|
| Revenue | $27,707,951 | $182,485,439 |
| Operating deductions and company's first preferential | 23,463,470 | 170,443,916 |
| Balance available for return on new money invested under contract | $4,244,480 | $12,041,522 |
| Company's second preferential representing interest and sinking fund on company's contribution to construction and equipment under contract | 5,316,510 | 27,667,840 |
| Deficit representing amount by which revenue failed to equal interest and sinking fund on company's contribution to construction and equipment under contract | $1,072,029 | $15,626,318 |
| City's preferential representing interest and sinking fund on city's contribution to construction under contract, unearned and unpaid | 4,076,918 | 32,917,231 |
| Deficit representing amount by which revenues failed to equal company's and city's interest and sinking fund on contributions to construction and equipment | $5,148,948 | $48,543,550 |

## Hearing on Receivership Claims Closed

The second and closing hearing on claims growing out of the receivership for the Pittsburgh Railways, lifted last February, was held recently by former

Judge Henry G. Wasson, special master for the court in railway receivership matters. C. S. Mitchell, auditor, and Thomas Fitzgerald, general manager, for the railway, with others were heard, and Mr. Wasson announced he will now prepare his final report to the United States District Court, whose ward the railway was while in the hands of receivers.

It developed at one of the previous hearings that the receivers have paid no money out of the $500,000 left in their hands last April and that payment of their counsel and others ceased on Feb. 1, at which time the company took over the property. The receivers will be discharged officially when Mr. Wasson's report on the case is approved by the United States District Court.

## $1,000,000 Detroit Equipment Trust Issue Includes Buses

Eight heavy interurban passenger cars with motors, 6 interurban passenger chair cars with motors, 15 double-truck, 52-passenger one-man cars with motors, 50 box cars each of 30 tons capacity, 25 29-passenger, single-deck, six-cylinder motor coaches, 10 66-passenger, semi-closed, double-deck, six-cylinder motor coaches and 40 29-passenger, single-deck, four-cylinder motor coaches have been pledged to the Union Trust Company, Cleveland, by the Detroit United Railway as security for an issue of $1,000,000 of general equipment trust 6 per cent certificates, series A. The securities are being offered to the public by Watling, Lerchen & Company, Detroit, and the Union Trust Company, Cleveland, at prices to yield from 5 per cent to 6 per cent, depending upon the maturity. The equipment pledged as security for the loan cost in excess of 133 per cent of the principal amount of the issue.

The equipment certificates are dated Nov. 1, 1924, and are due in equal semi-annual payments in annual amounts of $150,000 for the first five years and $50,000 for the remaining five years. Payment of principal and interest is unconditionally guaranteed by the Detroit United Railway by indorsement on each certificate. The equipment will be leased to the Detroit United Railway at rentals sufficient to provide for the semi-annual installments of both interest and the amount due to amortize the purchase cost.

## Service Resumed in Kewanee

After a suspension of more than a year railway service was resumed in Kewanee, Ill., on Nov. 29 by the Kewanee Public Service Company. Cars in Kewanee and on the interurban line between Kewanee and Galva ceased to operate because of a combination of circumstances, prominent among which were jitney competition and the increased use of the private automobile. The property was then under the management of the Galesburg & Kewanee Electric Railway.

The intention was to scrap the line, but in June of this year the citizens of Kewanee, a town of 17,000 inhabitants, voted to accept suggestions made by B. F. Lyons, the new owner, for rehabilitating the property. All Mr. Lyons wanted was assurance that in the future the company would be dealt with fairly by the public.

The action of the voters granted the Kewanee Public Service Company a franchise to operate the electric and gas utilities in Kewanee for a period of twenty-five years. The railway franchise, granted at the same time, extended that grant for a period of twenty years, the longest term obtainable under the Illinois law. As a result of the negotiations conducted at that time the Kewanee Public Service Company was organized to own and operate the electric light and power, gas and street railway business in Kewanee, the gas business in Galva, and do electric light and power business in Sheffield and Neponset. The company, through its subsidiary, the Kewanee & Galva Railway, will also operate a short interurban line connecting Kewanee and Galva. The whole undertaking was financed largely through the sale last July of $1,200,000 of first mortgage 6 per cent gold bonds, Series A of the Kewanee Public Service Company, Kewanee, Ill. The proceeds of this issue was used by the company to take over the properties of the Consolidated Light & Power Company, the municipal plant built by the city of Kewanee and to acquire the street railway and interurban properties.

## Status of Denver Viaduct Claims Fixed

The title "$200,000 Verdict Against Denver Tramway," with which an item about the Denver Tramway in the ELECTRIC RAILWAY JOURNAL for Oct. 25 was introduced, was somewhat misleading. The facts are that the city of Denver applied to the lower court for an order to have the monthly payments under the 1906 franchise declared to be in a preferred class. This plea was denied. The city then appealed to the Circuit Court of Appeals. That court held that the payments accruing subsequent to the receivership were in the nature of operating expenses and therefore entitled to preference, while those accruing prior to the appointment of the receiver were entitled to preference only over ordinary creditors but junior to lien holders which had attached. The only question involved in the proceedings was whether these payments were in a preferred class. It was never the contention of the railway that it did not owe the money.

The Sixteenth Street viaduct and the extensions thereto were originally constructed in 1889 and 1910 respectively by predecessor companies of the Denver Tramway at a total cost of $256,231 and deeded to the city under an agreement that the city was perpetually to maintain it. The steam railroads and other interests subsidized the construction of the old viaduct to the extent of $79,897.

It was decided by the city in 1921 to rebuild the viaduct, and in order to insure that the work would be done expeditiously and at the least cost to the city, it was decided to use the facilities of the tramway. An agreement was made with the city to pay on the basis of actual cost for such work as it ordered done by the tramway. The actual cost of the work performed f the city by the company was $67,6 and bills were rendered accordingly.

In addition to the work done for t city, the company expended for its ow account $100,033 on track, overhea paving, etc., and also suffered an i crease of $76,444 in operating expens by reason of the rerouting of servi while the viaduct was under constru tion. No part of these two amoun was included in the bill against the cit

**Mortgage Bonds Offered.** — Dillo Read & Company and Tucker, Anthon & Company, New York, are offering 95 and interest to yield about 5.35 p cent $1,000,000 in first refunding mor gage 5 per cent sinking fund gold bon of the Manchester Traction, Light Power Company, Manchester, N. The bonds are dated Aug. 1, 1917, a are due Aug. 1, 1952. The compan operates railways in Manchester a vicinity.

**Auction Sales in New York.**—At t public auction rooms of A. H. Muller Sons there were sold this week $2,0 of Twenty-eight & Twenty-nint Streets Crosstown Railroad, New Yor first mortgage 5 per cent gold bon due October, 1996; October, 1908, a subsequent coupons attached, $50 l Last week at the same offices the were sold 20 shares of West Virgini Traction & Electric Company 7 per ce cumulative preferred, $5 for the lot, a certificates of deposit for 116 shares Kansas City Railways preferred; cert ficates for 26 shares Kansas City Ra ways common, $36 lot; also $12,6 Berwick & Nescopeck Street Railwa first mortgage 5 per cent bonds, d 1944, $550 lot.

**New Directors for Illinois Properties** — George F. Otis, president of the Ce tral Trust Company of Illinois, Ch cago, has been elected a director of t Illinois Power & Light Corporation, a George T. Buckingham, of the law fir of DeFrees, Buckingham & Eaton, Ch cago, has been elected a director of th North American Light & Power Com pany, both of which are included in th group of properties of which the Illino Traction System is a part.

**Stock of Jamaica Company Increased** —Shareholders of the Jamaica Publi Service Company, Ltd., Kingston, Ja maica, B. W. I., on Nov. 28 approve a resolution increasing the authorize capital of the company from $1,500,00 to $2,000,000, the increase to take th form of $250,000 in 7 per cent cumula tive preference stock B of a par valu of $5 per share and $250,000 in share of ordinary stock of a par value of $5 each. Included in the property of th company are 26 miles of electri railway.

**Restoration of Service on Prope Guarantees.**—The Worcester Consoli dated Street Railway has not entirel abandoned the idea of restoring servic from Worcester, Mass., and Leices ter and Spencer. Clark V. Wood, presi dent, says that service might be re stored if there was any indication of sufficient demand or any assurances o support from town officials. Th Spencer line at one time was one o the principal suburban lines of th company. It was discontinued severa

months ago when bus competition made it impossible to operate the route to advantage. At that time townspeople expressed preference for buses.

**Discontinuance Expected.**—The Medway & Dedham Street Railway, which runs through the towns of Medway, Millis, Westwood and Dedham, Mass., planned to suspend operations Dec. 1. The action was decided upon when it became apparent that the accumulating deficits could not be overcome. Last year each town which the road served appropriated $1,000 for assistance. The deficit kept growing, however, and the directors decided not to burden the towns any longer. The line has been in operation for 25 years. It originally ran to Franklin. Failure to show profit resulted in the junking of the Franklin line several years ago. Present plans call for early disposition of the entire property, including the carhouse and power station at Westwood. The road is 18 miles long. It was leased by the Milford & Uxbridge Street Railway for several years. That company gave up control three years ago.

**Mortgage Bonds Offered.** — Harris, Forbes & Company and Spencer Trask & Company, New York, are offering at 97½ and interest yielding more than 5.15 per cent $1,100,000 of first mortgage gold bonds of the Wisconsin Gas & Electric Company, Kenosha, Wis. The bonds, known as 5 per cent series A, are dated June 1, 1912, and are due June 1, 1952.

**Deficit of $628,480.**—The total revenue of the Interborough Rapid Transit Company, New York, N. Y., for the four-month period ended Oct. 31, 1924, was $18,422,630. This represented an increase of $465,524 over the similar period a year ago. The operating expenses, taxes and rentals paid the city for the old subway were $12,426,868, a decrease of $426,957 over the similar four months in 1923. The income available for all purposes for the four-month period of 1924 ended Oct. 31 was $5,511,379, an increase of $1,473,183 over a similar period a year ago. The balance after actual maintenance in 1924 was a deficit of $628,480, an increase of $1,168,234 over the four-month period ended Oct. 31, 1923.

**Hearings on Abandonment Concluded.**—Hearings on the proposed abandonment of the lines of the Pacific Electric Railway in Riverside, Cal., before the State Railroad Commission closed recently. The company provided statements to show that it had been losing money steadily on the local lines. The matter has been referred to before in the ELECTRIC RAILWAY JOURNAL.

**Final Judgment in Receivership Case.**—The Court of Appeals in Albany has handed down a decision confirming a judgment obtained in June, 1923, by Newton M. Hudson, receiver for the Central Park, North & East River Railroad, against the Forty-second Street, Manhattanville & St. Nicholas Avenue Railway. The amount of the judgment is $51,506. The decision will bring to an end a receivership dating back to 1912, and make it possible for the Central Park Company to pay to its creditors 100 cents on the dollar. The Central Park Company formerly was one of the leased lines operated by the Metropolitan Street Railway. In August, 1908, the United States District Court ordered it turned back to its stockholders, terminating the lease. George W. Linch, at that time receiver for the company, succeeded after a long legal battle, in reducing the claims against the company to $303,000. Finally there remained a claim on the part of the Central Park Company against the Forty-second Street, Manhattanville & St. Nicholas Avenue Railway under an old trackage agreement. This claim was prosecuted and resulted finally in the decision mentioned previously. Mr. Linch died in 1915 and John Beaver was appointed to succeed him. He died in 1917 and Mr. Hudson succeeded him.

**Expenses Lower.**—The Grand Rapids Railway, Grand Rapids, Mich., recently reported to the city manager that operating expenses were reduced $2,047 in October from the October, 1923, figure. The report shows the company failed by $11,853 to return its allowable 7½ per cent on its valuation. There was only 1.13 per cent decrease in the passenger revenue and the gross income of $49,632 showed an increase of $2,584 over October, 1923.

**$1,250,000 of Preferred Stock Offered.**—Offering is being made by Pynchon & Company, West & Company and Jackson & Curtis, New York, of a new issue of $1,250,000 Broad River Power Company 7 per cent cumulative preferred stock. The Broad River Power Company was organized in July, 1924, in South Carolina for the purpose of acquiring the entire outstanding common and preferred stock of the Columbia Railway, Gas & Electric Company, which owns or controls all the outstanding common stock of the Parr Shoals Power Company and Columbia Gas Light Company, Columbia, S. C. In pursuance of this plan the company will now take over substantially all of such preferred and common stock of the Columbia Railway, Gas & Electric Company and of the preferred stock of the Parr Shoals Power Company.

# Legal Notes

MISSOURI. — *Passenger Remains Such Until He Has Alighted and Is Entitled to High Degree of Care While Alighting.*

In this case, the conductor on an interurban road was assisting passengers to alight at a stop and after helping a woman down part way, turned to help another, and the first one fell and was injured. The court held that a passenger remains such until he alights and that a very high degree of care is imposed by law on the railway during the time that the passenger is attempting to alight. Since the conductor undertook to aid this passenger, he should have used due care in doing so. (Lackey vs. Missouri & K. I. Railway, 264 Southwest. Rep., 807.)

OKLAHOMA.—*Powers of Public Service Commission—Regulation Does Not Mean Management or Operation by Commission.*

This case was an appeal from a ruling of the State Corporation Commission of Oklahoma that persons who dine in the railroad restaurants of the Santa Fé Railroad must wear coats was unreasonable. The ruling was directed to Fred Harvey, a corporation operating the dining rooms, but the railroad company joined in the appeal. The Oklahoma Supreme Court, in deciding against the commission, laid down certain principles in regard to commission regulation which are of interest. One was that the commission has authority to deal with the servants of a public utility only so far as may be necessary to carry into effect a lawful order against its master or principal, and against such principal should all such orders be entered. A second was that while much power is by law given to the Corporation Commission in the regulation of public utilities, yet the utility is not the property of the commission or the state, but belongs to the company and its stockholders, and the officers and directors by them selected must, under proper regulation, be permitted to manage the property in such proper way as to earn and pay, if they lawfully can, just dividends to the stockholders. Regulation must not be so far extended as to constitute management or operation. A third was that a public utility has the right to prescribe and enforce reasonable rules and regulations for the government and use of its property, and no such rule should be abrogated by the Corporation Commission, unless it is contrary to the law of the state, or is clearly proved to be unjustly and injuriously discriminatory, or is so arbitrary and unreasonable as to be decidedly unjust to its patrons. A rule that is made applicable equally to all and with which all can comply with equal ease is not discriminatory. (Harvey et al. vs. Corporation Commission of Oklahoma, 229 Pacific Rep., 428.)

TEXAS.—*Duty of Railway Company to Warn Employees of Independent Contractor of Danger. Damages Collectible from Both Railway and Employer.*

A causeway which was used by an electric railway and several steam roads was destroyed in part by a storm, and its reconstruction was let to a contractor who agreed to be responsible for injuries developing in the work. An employee of the contractor while operating a derrick was killed by an electric shock when the cable on the derrick came in contact with the overhead trolley wire. The decedent's representatives collected a certain amount from the insurance company protecting the contractor under the workmen's compensation act and an additional amount from the electric railway, it being held that the railway had not sufficiently warned the employee of the contractor of the danger from its uninsulated wires. (Galveston-Houston Elec. Ry. Co. et al. vs. Reinle, 264 Southwest. Rep., 783.)

# Personal Items

## Stone & Webster Managerial Changes Announced

Walter M. Bird, formerly manager of the Keokuk, Iowa, Electric Company, has been appointed manager of the Paducah, Ky., Electric Company and the Paducah Railway, succeeding Alfred S. Nichols, who is now manager of the Jamaica Public Service Company, Ltd., at Kingston, Jamaica. Philip M. Wentworth, formerly manager of the Fort Madison, Iowa, Electric Company and Dallas City, Ill., Light Company, succeeds Mr. Bird as manager of the Keokuk company, and J. Bertram Hayes, for the past eighteen months assistant to the manager of the Jamaica Public Service Company, Ltd., is the new manager of the Fort Madison and Dallas City companies. All these utilities are under the executive management of Stone & Webster, Inc., Boston, Mass.

## A. L. C. Fell an Outstanding British Tramway Figure

The duties of A. L. C. Fell, who will retire as general manager of the London County Council Tramways, London, England, on Dec. 31, will be carried on after that time, temporarily at least, by J. K. Bruce, traffic manager of the system. As explained very briefly in the ELECTRIC RAILWAY JOURNAL for Nov. 8, Mr. Fell is retiring owing to ill health. For 21 years he has occupied the post that he is now about to relinquish.

In a full-page appreciation of Mr. Fell which the *Tramway and Railway World* published in its issue of Nov. 20, that paper explained that during Mr. Fell's tenure of office in London, traffic receipts and the number of passengers went up rapidly for a long time, but that there was a slacking down during the war, followed by great increases of working expenses. Finally came the great development of omnibus competition. This same English authority points out that it is a notable fact that the average speed of the lines under Mr. Fell has been gradually increased until it is now 9¼ m.p.h., the highest in Great Britain.

Mr. Fell is by training an electrical engineer. He was responsible for the installation of electric traction on the tramways of Cork. In 1900 he became tramway electrical engineer to Sheffield Corporation and superintended the electrification of the lines there. Thereafter he became general manager, and in 1903 he resigned his position at Sheffield to become general manager of London County Council Tramways.

## A. J. Klatte in New Post at Chicago

A. J. Klatte has been appointed assistant electrical engineer of the Chicago Surface Lines. There has been no such title in the Surface Lines organization since 1915, at which time H. M. Wheeler died. The electrical engineer, J. Z. Murphy, has not been in good health for some time past and during his absence the department will be under the supervision of Mr. Klatte.



A. J. Klatte

Mr. Klatte was born at Milwaukee, Wis., on July 1, 1879. He received his preliminary education at Beloit College and was graduated from the school of engineering at the University of Wisconsin in 1905. His first work was as level man and transit man on steam railroads. He has been connected with the Chicago street railway properties since 1908. His first work there was as conduit engineer with the Chicago Union Traction Company. Later he was engineer in charge of conduits and since the Surface Lines was formed in 1914 he has been engineer of electrical distribution.

## E. G. Dunlap Vice-President at Youngstown

Elton G. Dunlap was elected vice-president of the Pennsylvania-Ohio Power & Light Company and the Pennsylvania-Ohio Electric Company, Youngstown, Ohio, on Nov. 20 to succeed the late Randall Montgomery. The two companies operate the power and light properties in Youngstown and in New Castle, Pa.; Sharon, Pa., and elsewhere in eastern Ohio and northwestern Pennsylvania and the interurban and city railways and coach lines in the same territory. Mr. Dunlap was born near Youngstown on Oct. 20, 1881. He entered the employ of the railway and electric companies in 1901 in the accounting and treasury department and rose through various grades of accounting and treasury work till he was elected treasurer of the properties in 1910. He has held that office since and continues now as treasurer as well as vice-president.



E. G. Dunlap

# Obituary

## John Lyell Harper

John Lyell Harper, at one time operating and construction engineer for the Twin City Rapid Transit Company, Minneapolis, Minn., and recently vice-president and chief engineer of the Niagara Falls Power Company, Niagara Falls, died on Nov. 28. Mr. Harper was considered one of the leading hydro-electric engineers in the United States. In 1902 Mr. Harper became associated with the Niagara Falls Hydraulic Power & Manufacturing Company as assistant engineer to the late Wallace C. Johnson. Sixteen years later, when the various power interests at Niagara Falls were grouped into a new corporation, under the name of the Niagara Falls Power Company, Mr. Harper was made chief engineer. Upon completion of the war-time power plant, he was elected vice-president of the corporation. Mr. Harper was graduated from Cornell University. He was fifty-one years old.

**J. M. McElroy**, formerly general manager of the Manchester Corporation Tramways, Manchester, England, died on Nov. 16 in Lancashire. He retired from the managership in February, 1922, owing to ill health. Mr. McElroy had been in the Manchester municipal service in different capacities since 1880. In 1901 he was appointed manager of the tramway undertaking after it was acquired by the municipality. It was under his auspices that the Manchester system was developed. He visited the continent of Europe and the United States to study tramway matters and during the war was a consultant to the government on transportation questions. Mr. McElroy was an original member of the Municipal Tramways Association and in the position of secretary and later as president he contributed largely to the growth of that body. He was largely responsible for the formation of the National Joint Industrial Council for the tramway industry.

**Dr. Charles A. Abbott**, who for many years has been an examining physician and surgeon for the International Railway, Buffalo, N. Y., died Dec. 1 after an illness of less than two weeks. He was stricken after testifying in court in a negligence case for the railway company.

# Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

## Order Placed for Experimental Buses in Detroit

The city of Detroit proposes to rent 25 buses from the Dodge Brothers Motor Company. Action to this end was recommended by the Street Railway Commission following a conference between the members of the commission and John W. Smith, Mayor of Detroit. Bids were asked for the rental of buses to the city for use in conjunction with the municipal railway. The City Council has informally approved the plan.

The commission also recommended the purchase of five buses from each of three firms: The Yellow Coach Manufacturing Company, Chicago; the Standard Motor Truck Company, Detroit, and the Gotsfredson Truck Company, Detroit. The idea is to make a comparative test of the various types of vehicles in actual service.

The commission's recommendation relative to the purchase of 15 double-deck buses, five from each of the two Detroit concerns and five from the Yellow Coach Manufacturing Company, was also approved by the Council in committee. Following a conference with Mayor Smith, it was announced that all were agreed that the city should encourage and support the motor bus industry in Detroit, but that orders should not be placed with local manufacturers on the basis of civic pride alone, particularly if the purchases involved equipment that carried with it the possibility of still further experimental work on the part of the manufacturers.

The buses which the commission proposes to rent will provide transportation facilities for stub-end lines in outlying districts during the winter months. Each bus will accommodate 21 passengers, whereas the buses which are to be purchased will carry approximately 60 passengers each.

According to the terms proposed the city will pay a rental of 29 cents per mile. This rental will be applied on the purchase price of the buses at the end of four months if it is decided to purchase them from Dodge Brothers.

## Mack Parlor Car Buses on Rochester Run

The Third Avenue Bus Company, a subsidiary of the New York State Railways, Rochester, has recently placed in service two of the latest type of luxurious Mack parlor car buses. These buses are operating on a regular schedule between the downtown section of Rochester and the town of Browncroft. The fare charged is 25 cents.

The bodies were built by the Lang Body Company, Cleveland. They seat 22 passengers in comfortable individual wicker chairs upholstered in genuine leather. Space is provided over the rear wheel for housing passengers' baggage. Wide clear-vision windows, automatically operated by springs, are easily adjustable to any elevation desired.



Mack Bus Intended for De Luxe Suburban Service

The Mack bus chassis on which these bodies are mounted have a wheelbase of 230½ in. They are powered by four-cylinder bus engines of special design, having a 4½-in. bore and 5-in. stroke. Each is equipped with two independent sets of brakes, one set operating on the rear wheels and the second set on the drive shaft just rearward of the transmission. Patented Mack rubber shock insulators on the spring ends support the unusually low frame.

## Big Bus Order Divided

Decision has been made by the Public Service Railway, Newark, N. J., to divide its order for 100 new buses between the Yellow Coach Company and the White Motor Company. This order was mentioned in ELECTRIC RAILWAY JOURNAL, issue of Nov. 15, 1924. Of the new buses 50 will be type Z, 29-passenger Yellows, and 50 will be Whites, type 50-A with Bender bodies. It is expected that deliveries will begin within the next three weeks.

## New Tramway System in Argentina

The municipal authorities of the city of Rosario, Argentine Republic, in May, 1924, sanctioned an ordinance calling for public bids for the construction of nearly 150 km. of a new system of electric street railway. This new installation will practically double the length of track now in service. The successful bidder will have 5 years within which to complete the contract, and is obligated to open for public service 25 km. of new lines each year.

In the descriptive matter sent out by the municipality it is specified that the gage of the track shall be 1 m. 435, that the trolley wire shall be of hard-drawn copper or phosphorus bronze at least 8.5 millimeter diameter and that the rails in all paved streets shall be of the type called Phoenix, weighing 45 kilos per lineal meter or of the Vignole type weighing 33 kilo per meter in unpaved streets.

Other things specified have to do with various phases of the technical and financial sides of the contract and the conditions under which they may be operated during the life of the concession.

The bids will be opened in Rosario on April 2, 1925. Requests for the usual data sheets and contract forms should be made to Senor Don Carlos Edwards, pro-secretario, Secretaria de la Intendencia Municipal, Rosario de Santa Fé, Argentina.

Mention was made of this project in the ELECTRIC RAILWAY JOURNAL, issue of Nov. 22, page 900. Details covering the complete specifications may be inspected at the New York offices of this paper.

## 200 Gas-Electric Buses for Philadelphia

The Philadelphia Rural Transit Company, a subsidiary of the Philadelphia Rapid Transit Company, has placed orders for 200 gas-electric buses after a series of tests. All of the electrical equipment on the first bus and on the 200 now on order is supplied by the General Electric Company for the Yellow Coach Manufacturing Company, Chicago.

These are double-deck buses, seating 64, of the type usually equipped with mechanical drive. The bus on which the first electrical equipment was installed weighs 16,760 lb. completely equipped.

Power is supplied by a six-cylinder Herschell-Spillman engine with a 4-in. bore and 6-in. stroke. The clutch and change gear transmission which are ordinarily used are replaced by a generator, which is direct connected to the engine flywheel through an internal external gear coupling.

Two GE-1079 motors, rated 85 amp. at 125 volts and 1,650 r.p.m., mounted sire by side in the chassis, transmit the power to the rear axle through two propeller shafts, each geared to a rear wheel, eliminating the differential, and providing constant torque on both wheels. These motors are self-ventilated and have a relatively long frame of small diameter permit-

## ELECTRIC RAILWAY MATERIAL PRICES—DEC. 2, 1924

### Metals—New York

| | |
|---|---|
| Copper, electrolytic, cents per lb. | 14.25 |
| Lead, cents per lb. | 8.65 |
| Nickel, cents per lb. | 29.50 |
| Zinc, cents per lb. | 7.40 |
| Tin, Straits, cents per lb. | 55.00 |
| Aluminum, 98 to 99 per cent, cents per lb. | 27.00 |
| Babbitt metal, warehouse, cents per lb.: | |
| Fair grade | 50.00 |
| Commercial | 75.00 |

### Bituminous Coal

| | |
|---|---|
| Smokeless mine run, f.o.b. vessel, Hampton Roads | $4.275 |
| Somerset mine run, Boston | 2.075 |
| Pittsburgh mine run, Pittsburgh | 1.875 |
| Franklin, Ill., screenings, Chicago | 1.475 |
| Central, Ill., screenings, Chicago | 1.30 |
| Kansas screenings, Kansas City | 2.35 |

### Track Materials—Pittsburgh

| | |
|---|---|
| Standard Bessemer steel rails, gross ton | $43.00 |
| Standard open hearth rails, gross ton | 43.00 |
| Railroad spikes, drive, Pittsburgh base, cents per lb. | 2.875 |
| Tie plates (flat type), cents per lb. | 2.425 |
| Angle bars cents per lb. | 2.75 |
| Rail bolts and nuts, Pittsburgh base, cents, lb. | 3.875 |
| Steel bars, cents per lb. | 2.10 |
| Ties, white oak, Chicago, 6 in.x8 in.x8½ ft. | $1.45 |

### Hardware—Pittsburgh

| | |
|---|---|
| Wire nails, base per keg | 2.85 |
| Sheet iron (28 gage), cents per lb. | 3.50 |
| Sheet iron, galvanized (28 gage), cents per lb. | 4.60 |
| Galvanized barbed wire, cents per lb. | 3.65 |
| Galvanized wire, ordinary, cents per lb. | 2.60 |

### Waste—New York

| | |
|---|---|
| Waste, wool, cents per lb. | 16 |
| Waste, cotton (100 lb. bale), cents per lb.: | |
| White | 13–19 |
| Colored | 10–15 |

### Paints, Putty and Glass—New York

| | |
|---|---|
| Linseed oil (5 bbl. lots), per gal. | $1.08 |
| White lead (100 lb. keg), cents per lb. | 12.00 |
| Turpentine (bbl. lots), per gal. | $0.81 |
| Car window glass, (single strength), first three brackets, A quality, discount* | 84.0% |
| Car window glass, (single strength), first three brackets, B quality, discount* | 86.0% |
| Car window glass, (double strength) all sizes, A quality, discount* | 85.0% |
| Putty, 100 lb. tins, cents per lb. | 4–6 |

* These prices are f.o.b. works, boxing charges extra.

### Wire—New York

| | |
|---|---|
| Copper wire base, cents per lb. | 16.375 |
| Rubber-covered wire, No. 14, per 1,000 ft. | $6.25 |
| Weatherproof wire base, cents per lb. | 17.75 |

### Paving Materials

| | |
|---|---|
| Paving stone, granite, 4x8x4, f.o.b. Chicago, dressed, per sq.yd. | $2.67 |
| Common, per sq.yd. | $1.00 |
| Wood block paving 3½, 16 treatment, N. Y., per sq.yd. | 1.85 |
| Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots | 2.20 |
| Crushed stone, ¾-in., carload lots, N. Y., per cu.yd. | 2.00 |
| Cement, Chicago consumers' net prices, without bags | 1.00 |
| Gravel, ¾-in., cu.yd., f.o.b. N. Y. | |
| Sand, cu.yd., N. Y. | |

### Old Metals—New York and Chicago

| | |
|---|---|
| Heavy copper, cents per lb. | 11.75 |
| Light copper, cents per lb. | 10.00 |
| Heavy brass, cents per lb. | 7.375 |
| Zinc, old scrap, cents per lb. | 4.125 |
| Yellow brass, cents per lb (heavy) | 6.125 |
| Lead, cents per lb (heavy) | 7.75 |
| Steel car axles, Chicago, net ton | $20.25 |
| Cast iron car wheels, Chicago, gross ton | 19.75 |
| Rails (short), Chicago, gross ton | 19.25 |
| Rails, (relaying), Chicago, gross ton | 26.50 |
| Machine turnings, Chicago, gross ton | 11.25 |

ting assembly under the body without sacrifice of road clearance.

After a series of exhaustive tests the bus using the electric drive was put into regular passenger service in August, 1924, and has been in constant operation since, averaging 150 miles daily.

## *Rolling Stock*

**Johnstown Traction Company, Johnstown, Pa.,** is considering the purchase of a number of light-weight, double-truck, one-man, two-man cars for city service.

**Fresno Traction Company, Fresno, Cal.,** has received two of the new universal type cars; the remaining 10 are en route. They were built by the St. Louis Car Company and cost $13,000 each. The cars are 48 ft. long. Each has a seating capacity of 50 persons. They may be operated by one or two-man crews. They are the first Fresno cars to be equipped with four motors, each of 30 hp. The cars were ordered more than a year ago, but delay in construction was due, it was stated, to difficulty in obtaining the safety door mechanism with which the cars are equipped.

**Key System Transit Company, Oakland, Cal.,** has placed orders for 12 new cars to be shipped within 60 days from the plant of the American Car Company, St. Louis, and will be assembled in the Oakland shops. They will be of steel construction, mahogany interior trim and monitor topped. The weight of each, including body, truck and equipment, will be about 68,000 lb. The cars are of the center-door type and each one will have a seating capacity of 68.

## *Power Houses, Shops and Buildings*

**Penn Public Service, Warren, Pa.,** operating an interurban line between Warren and Jamestown, N. Y., has work under way for a complete remodeling of its terminal at Warren. Under the terms of the new plan the company's general offices will hereafter occupy the entire second floor of the company's three-story building at Liberty Street and Pennsylvania Avenue West.

**Detroit, Mich., Department of Street Railways,** suffered the loss of $50,000 recently when its power plant "A" was crippled by fire. The damage was confined principally to machinery.

## *Trade Notes*

**Magnetic Signal Company, Los Angeles, Cal.,** announces that Ralph W. Payne has been appointed exclusive Southern representative for the company. His headquarters are in the Metropolitan Bank Building, 613 Fifteenth Street, N. W., Washington, D. C. He is in charge of sales and engineering for the Southern territory. Mr. Payne assumed his duties in Washington on Nov. 15.

**Philadelphia Storage Battery Company, Philadelphia, Pa.,** together with the Roberts Battery Company, its New England distributor of starting, lighting and radio equipment, has moved its Boston office on Nov. 25 to occupy new quarters at No. 1 Brighton Avenue. Much-needed office space, parts and stock department and a good service station equipment will make it possible for the interests of all Philadelphia battery lines to be cared for much more efficiently than at any time in the past. George W. Holden is district representative.

**A. C. Holden,** formerly sales manager of the household appliance division of the General Railway Signal Company, Rochester, N. Y., has been appointed resident manager of the Pacific Coast territory, with headquarters at San Francisco, Cal. Mr. Holden's connection with the General Railway Signal Company began in 1910. Since then he has made a special study of installation and construction work and, in the capacity of field engineer, he had charge of the company's field office at St. Paul, and later was connected with the Chicago, Montreal, New York and Rochester offices. From June, 1916, to January, 1919, his entire attention was devoted to construction work in the eastern district, special attention being given to the signaling of the subway, tube and elevated construction of the New York Municipal Railway lines in New York and Brooklyn. Mr. Holden was born at Waterloo, Iowa. He was graduated from the electrical engineering department of Iowa State College. His first signal experience began in the summer of 1902, with the Hall Signal Company. During portions of 1904 and 1905 he was employed as laborer by the Taylor Signal Company, as paymaster by the Hall Signal Company and draftsman in the signal department of the Union Pacific.

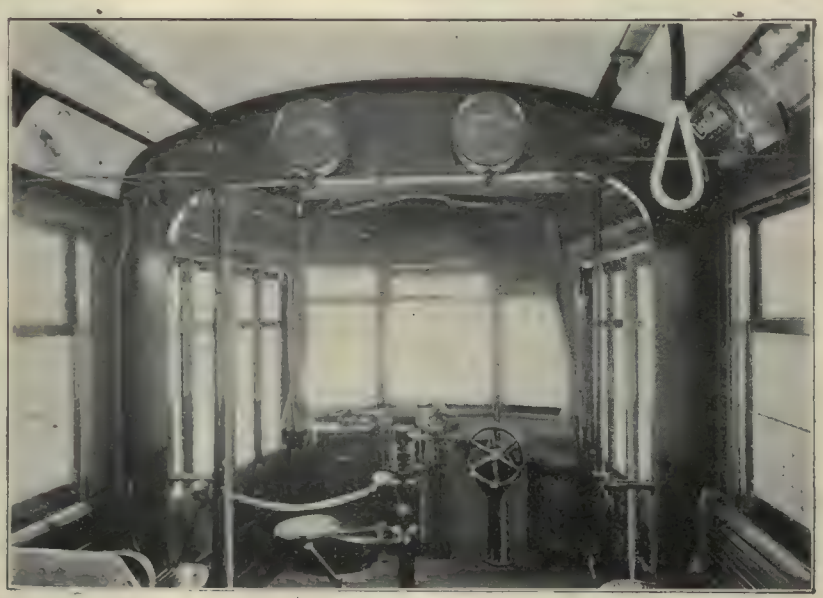
**Hyman-Michaels Company, Chicago,** due to expansion in the railway equipment field, has engaged the services of F. W. Glauser, formerly associated with the Mid-Continent Equipment & Machinery Company, St. Louis, to assume the management of the equipment department for the Southern territory. Mr. Glauser has a wide and valued experience in railroad work. He will be located at St. Louis.

## *New Advertising Literature*

**General Electric Company, Schenectady, N. Y.,** has published "Pendant and Bracket Novalux," bulletin No. 43525, which describes and illustrates in 24 pages the different types of Novalux lighting units of the bracket and pendant types.

**Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.,** has just issued a new 40-page publication containing transportation hints. The subjects treated are: One-man operation, multiple-unit operation, articulated and permanently coupled cars, double-deck cars, the trolley bus, the internal combustion engine, schedule speeds, methods of fare collection, safety zones, multiple berthing, routing, the selective stop, queue loading, the traffic problem and the elimination of non-productive mileage. The purpose of the book is to summarize results that have been obtained on various railways throughout the United States using equipment of various types, and to suggest ways of improving the operation by the use of special equipment and methods. It is well written and is in effect a textbook on the subject of improving city transportation methods.

# PEACOCK



## It feels good to ride behind reliable Peacock Staffless Brakes on up-to-date cars



The Peacock Staffless

If power goes off, and air brakes fail—with the car on a steep grade and 70 or 80 passengers crowded aboard—the Peacock Staffless WILL HOLD.

The stop will be sure—certain—GRADUATED—as will also be the RELEASE. There is no doubt about Peacock action—no failure—the control of the car is perfect at all times.

The Peacock Staffless occupies about half the space, weighs no more, and gives 3 times the power of the ordinary hand brake.

Riding behind a Peacock is to ride with *safety*.

Specify it on your new cars.

**National Brake Co., Inc.**

**890 Ellicott Square, Buffalo, N. Y.**

***Canadian Representative***

**Lyman Tube & Supply Company, Limited, Montreal, Canada**

# BRAKES

# Bankers and Engineers


## Ford, Bacon & Davis
Incorporated
Engineers
115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

## The J. G. White Engineering Corporation
Engineers—Constructors
Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.
43 Exchange Place New York

## STONE & WEBSTER
Incorporated
EXAMINATIONS REPORTS APPRAISALS
ON
INDUSTRIAL AND PUBLIC SERVICE PROPERTIES
NEW YORK BOSTON CHICAGO

## THE BEELER ORGANIZATION
ENGINEERS AND CONSULTANTS
Traction-Traffic-Equipment-Power
COORDINATION OF SERVICE—IMPROVED OPERATIONS
INCREASED TRAFFIC—FINANCIAL REPORTS
APPRAISALS—MANAGEMENT
52 Vanderbilt Ave. New York City

## SANDERSON & PORTER
ENGINEERS
REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS
RAILWAY, LIGHT and POWER PROPERTIES
CHICAGO NEW YORK SAN FRANCISCO

## A. L. DRUM & COMPANY
*Consulting and Constructing Engineers*
VALUATION AND FINANCIAL REPORTS
RATE STUDIES FOR PRESENTATION TO PUBLIC SERVICE COMMISSIONS
CONSTRUCTION AND MANAGEMENT OF ELECTRIC RAILWAYS
230 South Clark Street, Chicago, Ill.
215 South Broad Street, Philadelphia, Pa.

## ALBERT S. RICHEY
ELECTRIC RAILWAY ENGINEER
WORCESTER, MASSACHUSETTS
REPORTS - APPRAISALS - RATES - OPERATION - SERVICE

## ENGELHARDT W. HOLST
*Consulting Engineer*
Appraisals, Reports, Rates, Service Investigation, Studies on Financial and Physical Rehabilitation Reorganization, Operation, Management
683 Atlantic Ave., Boston, Mass.

## JAMES E. ALLISON & CO.
Consulting Engineers
Specializing in Utility Rate Cases and Reports to Bankers and Investors
1017 Olive St., St. Louis, Mo.

## JOE R. ONG
Consulting Transportation Engineer
*Specializing in Traffic Problems and in Methods to Improve Service and Increase Efficiency of Operation*
PIQUA, OHIO

## STEVENS & WOOD, INC.
Design and Construction of Power Stations
Railroad Electrification, Industrial Plants
REPORTS AND APPRAISALS
*Management and Financing of Utilities and Industrials*
Mahoning Bank Bldg., Youngstown, O.
120 Broadway, New York

## WALTER JACKSON
*Consultant on* Fares and Motor Buses
The Weekly Pass—Differential Fares
Ride Selling
143 Crary Ave., Mt. Vernon, N. Y.

## HEMPHILL & WELLS
CONSULTING ENGINEERS
Gardner F. Wells Albert W. Hemphill
*APPRAISALS*
INVESTIGATIONS COVERING
Reorganization Management Operation Construction
43 Cedar Street, New York City

## J. ROWLAND BIBBINS
*Engineer*—2301 Connecticut Ave., N. W. Washington, D.C.
TRANSPORTATION SURVEYS
Organized Traffic Relief and Transit Development
Co-ordinating Motor Transport, Railroad and City Plans, Service, Routing, Valuation, Economic Studies
EXPERIENCE IN 20 CITIES

## Dwight P. Robinson & Company
Incorporated
Design and Construction of
*Electric Railways, Shops, Power Stations*
125 East 46th Street, New York
Chicago Youngstown Atlanta Philadelphia
Los Angeles Montreal Rio de Janeiro

## KELLY, COOKE & COMPANY
Engineers
140 BROADWAY, NEW YORK
424 CHESTNUT STREET, PHILADELPHIA

# Magnet Wire—quality in quantities

Quality is essential in every magnet wire used.

Use Rome Magnet Wire and be assured of uniform quality in quantities large enough to meet any commercial need.

It is fabricated from wire bar to finished wire, all within Rome Mills. Specify sizes and shapes and let Rome send the wire.

**ROME WIRE CO., ROME, N. Y.**

*Mills and Executive Offices*
*Diamond Mills*, BUFFALO, N. Y.

NEW YORK 50 Church St. | BOSTON Little Bldg. | CHICAGO 14 E. Jackson Blvd. | CLEVELAND 1200 W. Ninth St. | DETROIT 25 Parson St.
LOS ANGELES, J. G. Pomeroy, 336 Azusa Street




The Most Successful Men in the Electric Railway Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

**Transmission Line and Special Crossing Structures, Catenary Bridges**

WRITE FOR OUR NEW DESCRIPTIVE CATALOG

**ARCHBOLD-BRADY CO.**
Engineers and Contractors SYRACUSE, N. Y.

DAY & ZIMMERMANN, INC.
ENGINEERS
DESIGN - CONSTRUCTION - REPORTS
VALUATIONS - MANAGEMENT
NEW YORK PHILADELPHIA CHICAGO

**Bureau of Commercial Economics, Inc.**
*Industrial Engineers*
Organization - Methods - Layout and Facilities
Public and Industrial Relations
72 West Adams Street - CHICAGO

C. B. BUCHANAN, President | W. H. PRICE, JR., Sec'y-Treas. | JOHN F. LAYNG, Vice-President
BUCHANAN & LAYNG CORPORATION
*Engineering and Management, Construction, Financial Reports, Traffic Surveys and Equipment Maintenance*
BALTIMORE 835 Equitable Bldg. | Phone: Hanover 2142 | NEW YORK 49 Wall Street

**THE P. EDWARD WISH SERVICE**
50 Church St. NEW YORK | *Street Railway Inspection* DETECTIVES | 131 State St. BOSTON

**HUMAN ENGINEERING**
*Railway Audit and Inspection Company, Inc.*
*Fourth and Chestnut Sts., Philadelphia*
Boston, New Orleans, New York, Pittsburgh } BRANCHES { Baltimore, Chicago, Atlanta, St. Louis

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.



# Clean Cut Interiors—
# *"Built In"* Quality

PLAY an important part especially when it comes to sturdy construction and detailed arrangement of wiring, furnishings, fixtures, etc., so built in that they do not become a source of annoyance after the body has been in operation a great length of time.

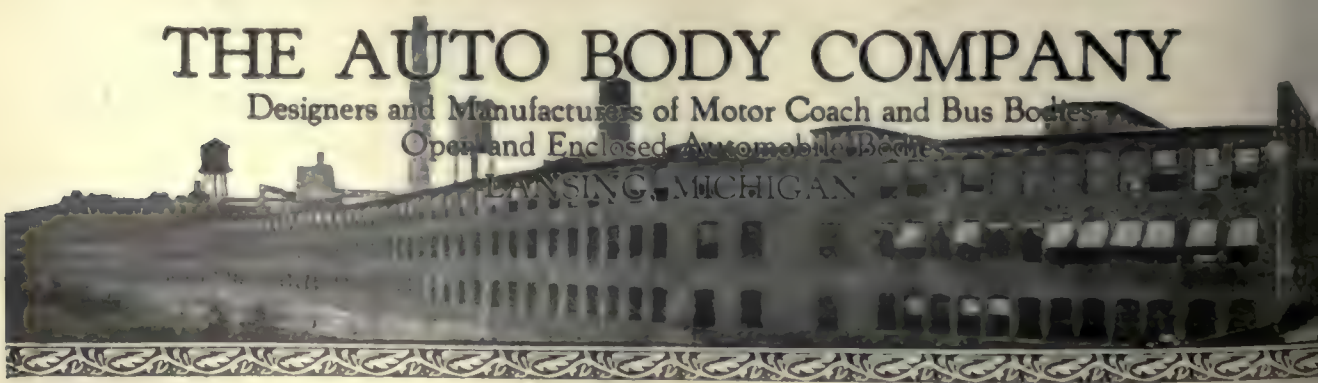


It is The Auto Body Company's modern method of quantity production by means of jigs, forms and assembly lines which combines pleasing appearance, durability, practicability, and riding comfort in the finished product that they are bringing into the Bus field.

The Auto Body Company has been selected, after careful consideration by leading bus chassis manufacturers, to design and manufacture their bodies. Why not take advantage of our 22 years' experience and large factory facilities?

## THE AUTO BODY COMPANY

Designers and Manufacturers of Motor Coach and Bus Bodies
Open and Enclosed Automobile Bodies
LANSING, MICHIGAN



# Standard Reliable Bodies Made by Superior

Included in the Superior line is a standard reliable body for practically every condition of service. With these standard Superior bodies there is all the individuality and distinction that goes with a specially designed and built body, for great care and thought has gone into the designs from which they are built, far more thought and engineering skill than could ever be put on any individual job.

There is a big plus value, too, that goes with every standard Superior body. In pictures and in actual samples you can see just how your job is going to look when delivered to you. You know just how the seating arrangement is going to work out and from the experience of others you can learn how the body will hold up in service.

With all these big advantages and the price advantage that goes with a standard reliable Superior body, is it any wonder that the bus trade is coming more and more to Standard Superior bodies?

Standard Superior bodies include the following: Light De Luxe, Medium De Luxe, Full De Luxe, Pay Enter, Pay Enter De Luxe and Parlor Car. Let us tell you more about these jobs, how they meet the transportation needs of the country in all their variations.



Superior De Luxe Body mounted on International Harvester chassis. Seating capacity 30 passengers.



Superior DeLuxe Pay-Enter body mounted on a Guilder chassis. Seating capacity 25 passengers.

## THE SUPERIOR MOTOR COACH BODY CO.

LIMA, OHIO

SUPERIOR BODIES



# Collier Service

A nation-wide organization building and sustaining car cardadvertising space values



**Barron G. Collier, Inc.**
Candler Bldg.
**New York**






# Reinforced To Insure Sturdiness

con Steel Poles are built to withstand the heaviest
s and impacts. Constructed of reinforced steel,
our corners are particularly strengthened to resist
both longitudinally and transversely to the line.
every pound of material is doing the maximum

great strength and durability of Truscon Steel
make them a profitable investment and when
ionally painted will practically last forever.
beauty of design lends to the attractiveness of
or highway. Different styles and sizes may be
or varying needs.

initial price of Truscon Steel Poles compares
ably with wood poles, but when their fireproof-
great strength and long life are considered they
ar more economical.

the coupon now and get the book which tells of
many other advantages.

USCON STEEL COMPANY, YOUNGSTOWN, OHIO
*Warehouses and Sales Offices from Pacific to Atlantic.*
*For addresses see phone books of principal cities.*
*Canada: Walkerville, Ont. Foreign Div.: New York*

**TRUSCON STANDARD STEEL POLES**

**Truscon Steel Company, Youngstown, Ohio.**

Please send me your booklet "Truscon Steel Poles."

Name .....

Address .....

E. R. J. 12-6-24

# The Measure of Your Message

THE measure of your message is the number of actual readers reached by the publications carrying your advertising.

You may buy "10,000 circulation," but is it delivered, or is it merely a "claim" of the publisher?

The A. B. C. offers a service that will enable the advertiser and advertising agent to measure every message placed in the leading publications of the United States and Canada.

Every day in all parts of the Continent A. B. C. auditors are checking the records of publishers, and their findings are tabulated in the form of A. B. C. reports.

These reports, by the authentic, reliable, verified data they contain, enable the advertiser to measure exactly how widely his message has been distributed.

*Ask for the latest A. B. C. Report on*
*ELECTRIC RAILWAY JOURNAL*
*It is a member of the A. B. C.*

(WRITE TO THE AUDIT BUREAU OF CIRCULATIONS, 202 SOUTH STATE STREET, CHICAGO, FOR A COPY OF "THE MEASURE OF YOUR MESSAGE")

**Before you buy POLES—See Weyerhaeuser**



*Weyerhaeuser Idaho Red Cedar Poles in the lines of National Park Service, Department of the Interior, Yellowstone National Park*

# Put Weyerhaeuser Responsibility Behind Your Pole Purchases

T IS a recognized fact that no one producer has a monopoly on the good pole timber in America. ut there's many a pole buyer who expects some- ing more than good poles that meet specifications. he Weyerhaeuser way of doing business should peal to this class of buyers.

Here is a specialized pole service with the back- g of an organization which for 65 years has been nown for reliability, integrity and the high quality its forest products.

When you deal with Weyerhaeuser you buy rect from a responsible producer who has the desire and facilities to take care of your requirements. Here you are assured uniformly high-class poles and dependable service on the trial order and on all future orders. You can expect at all times fair treatment, reasonable prices and the kind of protection that every good customer deserves.

The next time you need treated or untreated poles or piling give this service a tryout. Shipment is made from any one of our five well stocked, fully equipped Western storage yards direct to you without any unnecessary handling charges. Prices by letter or wire.

## WEYERHAEUSER SALES COMPANY

*Distributors:* WEYERHAEUSER FOREST PRODUCTS

General Offices · SPOKANE, WASHINGTON

*Branch Offices*

| ST. PAUL | CHICAGO | BALTIMORE | NEW YORK |
|---|---|---|---|
| 2694 University Ave. | 208 South La Salle St. | 812 Lexington Bldg. | 220 Broadway |

F. H. Burke, Chicago Office, Manager of Cedar Pole Sales

R. L. Bayne, Spokane Office, Manager of Cedar Pole Service

# Weyerhaeuser Idaho Red Cedar Poles




# The Cleveland Railway Company

*Pioneers Standardized Rail Welding Equipment*

ON THE Cleveland Railway, each welder, every day, has precisely the same UNA Welding Equipment with which to work, no matter what part of the Company's Rail Welding Program he has t carry out.

This insures efficiency, economy and uni formity of results.

## Why You Can Standardize on UNA Dynamotors

1. UNA Dynamotors were specially designed and developed to meet the welding and bonding requirements of the Electric Traction Industry.
2. UNA Dynamotors made in three standard types, economically meet the welding needs of both *large* and *small* properties.
3. UNA Dynamotors are used not only for Joint Welding but for every type of carbon arc and metal arc track welding and bonding as well.
4. UNA Dynamotors when not needed on the track are efficient shop welding units fo either carbon or metal arc welding.
5. UNA Dynamotors, as individual weldin units, meet every welding demand in ligh weight, portability, ruggedness, wide rang of welding current for either carbon o metal arc welding and bonding, high elec trical efficiency, low initial cost and mini mum maintenance.

Now is the time to get full information fo your 1925 Standardized UNA Weldin Equipment.

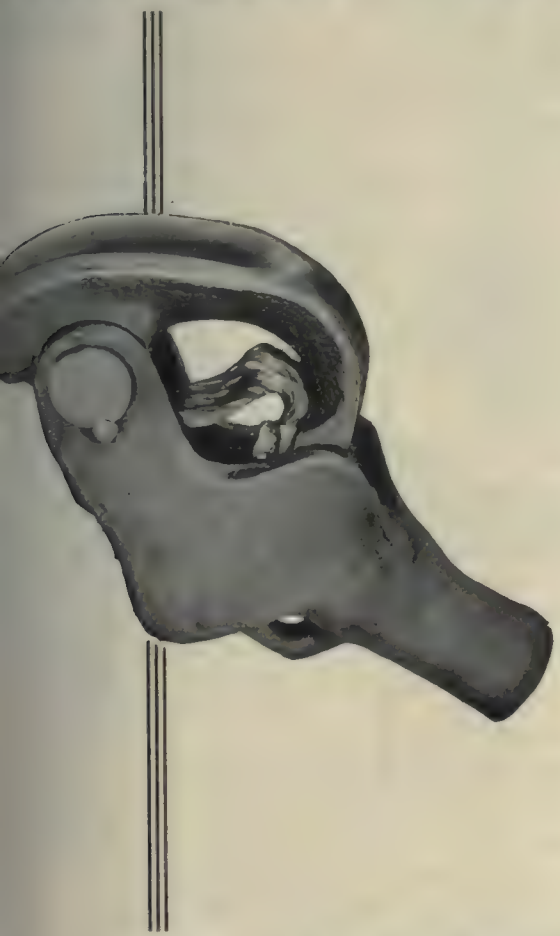
RAIL WELDING AND BONDING COMPANY, Cleveland, Ohio

Agents in England: Scholey Construction Company
137 Victoria St., Westminster, London



ast Fruit and Express Train with Miller Shoes
operated by Interstate Public Service Company

# MILLER TROLLEY SHOES



Miller Trolley Shoes have contributed to the advance made in Freight Service because they are *modern*. Little copper wheels were good enough in the days of slow speed and small current drafts but only a rugged sliding contact will stand up in these days of speed and heavy operating currents.

*Sliding contact* is the modern method. There is no arcing and burning of wire, no span pulled down, *and less wear on the wire and line equipment.*

For better operation and less cost use Miller Trolley Shoes.

The "Interstate" use Miller Trolley Shoes on both their passenger and freight cars.

*Try them on your cars*

## MILLER TROLLEY SHOE CO.

**No. 295 Columbia Road, Boston-21, Mass.**

***Western Representatives:*** **Economy Electric Devices Co., 1590 Old Colony Bldg., Chicago, Ill.**



# You will find Carnegie Steel Cross Ties in 'low-maintenance-cost' track

It is not a mere coincidence that Carnegie Steel Cross Ties are found in many 'low-maintenance-cost' tracks.

An interesting example is the Gilbert Avenue Viaduct in Cincinnati. Carnegie Steel Cross Ties, embedded in concrete, were used on this job and the viaduct was opened for service in 1912.

In 1923—eleven years later—it was found necessary to renew the rails. The concrete foundation and ties were in good condition. The engineer in charge stated that the ties were in almost perfect condition — no corrosion—no wear under the rails, and looked good for 20 or 30 years more of service. This stretch of track has been subject to as severe conditions as possible in that city.

Due to their success with Carnegie Ties, Cincinnati is now using them in their new work. The picture above is of a recent installation in that city.

Booklet —"Steel Cross Ties"—on request.

STEEL
CARNEGIE

Agricultural Sections
Alloy Steels
Angles
Auto Sections
**Axles**
Bands
Beams
Billets
Blooms
Bulb Sections
Car Sections
**Car Wheels**
Channels
Checkered Plates
Coal By-Products
Concrete Bars
Cotton Ties
***Cross Ties**
**Crushed Slag**
Ferro-Manganese
Forgings
Granulated Slag
Hoop Steel
Industrial Wheels
Ingots
Merchant Bars
Mine Timbers
Oil Derricks
Pig Iron
Plates
**Rails**
Sheet Bars
Sheet Piling
Ship Sections
Skelp
Slabs
Spiegeleisen
**Splice Bars**
Spring Steel
Structural Shapes
Tees
Threading Steel
Tire Steel
**Track Accessories**
Twisted Squares
Welding Steel
**Wheels**
Window Sections
Zees

CARNEGIE STEEL COMPANY
GENERAL OFFICES—CARNEGIE BUILDING
434 FIFTH AVENUE
PITTSBURGH, PA.

1720




# A VALUABLE BULLETIN

## for those who specify, buy or install pipe for Electric Car Services

Particularly valuable to those interested in more efficient pipe for air brake service. Explains how the former troublesome mill scale is eliminated from this class of pipe—leaving both inside and outside surfaces clean and smooth. Use the Coupon for your copy of this Bulletin.

**NATIONAL TUBE COMPANY** General Sales Offices FRICK BUILDING **PITTSBURGH, PA.**

*Please send Bulletin No. 7-"NATIONAL" Welding-SCALE FREE Pipe to*

*Name* .....

*Address* .....

.....



BOYERIZED equipment is setting new standards of long life and consequently at low cost in the railway field. The peculiar deeply-penetrating toughness imparted to steel by our special process gives these parts far longer life than ordinary untreated steel. The "Stuff" is in them.

# BOYERIZE

## Boyerized Products Include

- Brake Pins
- Brake Hangers
- Brake Levers
- Pedestal Gibs
- Brake Fulcrums
- Center Bearings
- Side Bearings
- Spring Post Bushings
- Spring Posts
- Bolster and Transom Chafing Plates
- McArthur Turnbuckles
- Manganese Brake Heads
- Manganese Truck Parts
- Bushings
- Bronze Bearings



## The McArthur Turnbuckle

When you once set it up it stays set up! The powerful spring-equipped split-clamp device which takes the place of the old-fashioned lock-nut idea, holds with an unshakable grip. Yet it takes only a small monkey wrench and a moment's time to tighten it up. Like all other Boyerized equipment, McArthur Turnbuckles have an unusually long wearing life.

*Try Them!*

## BEMIS CAR TRUCK COMPANY

***Electric Railway Supplies***

**Springfield, Mass.**

REPRESENTATIVES:

Economy Electric Devices Co., Old Colony Bldg., Chicago, Ill. W. F. McKenney, 54 First Street, Portland, Oregon
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal. J. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.



# Special Bethlehem Layouts

Bethlehem Frogs, Switches, Mates, Crossings and Special Layouts are produced in a separate specially equipped department devoted exclusively to the manufacture of street and steam trackwork. This department is backed by all the steel-producing, metallurgical and engineering facilities of the Bethlehem Steel Company, assuring correct design and a constant and uniform supply of the proper grades of material.

Illustration shows a Bethlehem Special Layout being installed at the most important traffic point in Osaka, Japan. Bethlehem Special Layouts are assembled complete under cover before shipment, assuring the minimum of labor in installation.

**A partial list of Bethlehem products for the electric railway field includes rails, spikes, trackwork, splice bars, bolts, tie plates, tie rods, pole line material, sheets, combination rolled and forged gear blanks, axles and rolled steel car wheels.**

BETHLEHEM STEEL COMPANY, *General Offices:* BETHLEHEM, PA.

Sales Offices:

New York Boston Philadelphia Baltimore Washington Atlanta Pittsburgh
Buffalo Cleveland Detroit Cincinnati Chicago St. Louis San Francisco

*Bethlehem Steel Export Corporation, 25 Broadway, New York City, Sole Exporter of our Commercial Products*

# BETHLEHEM




Consolidated DOOR ENGINES on the air
from station CCH

**This is station CCH the Consolidated Car Heating Company, broadcasting direct from its factory at Albany, on a wave length of one hundred per cent satisfaction.**

## "CONSOLIDATED" means DOOR ENGINES *also!*

THE message to listeners-in concerns door engines. You are invited to make a study of the Consolidated Door Engine proposition.

The name Consolidated stands for the highest type of complete pneumatic door operating equipment for folding or sliding doors and steps—either hand valve or push button control for all types of cars. Examine their many important safety features and details of construction. With Consolidated Door Engines, passengers will not be injured as doors cannot slam or exert a harmful squeezing pressure. This is accomplished by the simplicity and absolute safety of the engine by-pass valve, which prevents pressure from building up in the closing cylinder when the door is obstructed. In addition, a soft yielding cushion shoe makes the door absolutely harmless to even a small child.

When you think of Door Engines think of Consolidated; a line which includes the latest thing in *automatic* door operation, namely an electrically-operated step treadle device.

Station CCH now signing off until next week, when we will broadcast another program.

Good day!

## CONSOLIDATED DOOR ENGINES




CONSOLIDATED CAR HEATING COMPANY

New York ALBANY, N. Y. Chic



# St. Louis Built-
# *Ever-Wear* STEEL BODIES
## *for Street Railways-*

PIONEER experience in the building of every type of street railway car has enabled us to incorporate the practical advantages of spacious layout and quick passenger interchange with the luxury of the best automobile practice.

The illustrations show interior and exterior views of 29-passenger steel body recently built for the Houston Electric Company.

This "Ever-Wear" Steel body built in our quality shops will survive the chassis in normal service and it can be remounted when the original chassis is discarded.

In consulting us you are consulting manufacturers who are familiar with the best railway practice—exclusive builders for street railway companies.

*Write today for further particulars and prices.*

**St. Louis Car Company**
St. Louis, Mo.



# *Ask The Man Who Knows Us*

SOMEWHERE near you there's a Street Railway man who is responsible for keeping down maintenance. His road is buying Texaco Lubricants and receiving Texaco Service. Ask that man about Texaco Service. He will describe to you the friendly co-operation of Texaco Engineers. He will tell you how they came on the property, investigated, demonstrated and then made some very favorable recommendations. He'll tell you that, as the years roll on, Texaco Lubricating Engineers stand shoulder to shoulder with him and, in a quiet, interested, intelligent way they aided him in keeping down his costs.

He'll tell you that they never tried to assume any superior attitude, or to attempt to run his business, but that they worked with him in overalls, when necessary, to help him hang up a record of reduced expenses.

Possibly he'll tell you that these men knew what they were talking about, because back of them is the practical experience accumulated by all the Texaco Lubrication Engineers on roads aggregating hundreds of millions of car miles.

This man, if he is familiar with all the facts, will tell you that Texaco Lubricants are known, recognized and employed the world over in every branch of industrial endeavor. And so he was able to receive promptly, at all times, the correct grade of lubricant for every kind of equipment, for rolling stock, power plant, shop or truck.

And also Kerosene Burning Oils and Gasoline.

TEXACO

THE TEXAS COMPANY

DEPT. R-J. 17 BATTERY PLACE. NEW YORK CITY

HOUSTON · CHICAGO · NEW YORK

OFFICES IN PRINCIPAL CITIES

TEXACO

# 50,000 Tons NEW RAILS

First Quality
Hunts Inspected

80*-85*-90* ASCE and other sections complete with accessories.




Real Savings for Buyers

Immediate Delivery From Stock

*1 ton or 1000*

PHONE, WIRE OR WRITE FOR PRICES

L·B·FOSTER CO·

PITTSBURGH, PA. · NEW YORK CITY




# Are you using tokens?

THE advantages of tokens over split change and paper tickets are obvious to all of the street railway companies.

If you want tokens that are difficult to counterfeit, that are accurate in size and always fit the fare boxes, that wear well and stay sharp, we can make them for you.

Next to the Government Mints, we have the largest and most complete equipment for making coin quality tokens—an organization built up in the past 104 years.

We have recently made up a sample card showing the tokens which are most popular today. May we send you one free—without obligation?

Besides tokens, we supply the railway field with cup drawn admiralty *condenser tubing* as well as ***uniform buttons.***

## SCOVILL MANUFACTURING COMPANY

**Main Office, Mills and Factories—Waterbury, Conn.**

HIGHEST QUALITY—MATERIALS OF PRECISION—QUANTITY PRODUCTION

280 Broadway, New York
224 W. Lake St., Chicago
1213 W. 3rd St., Cleveland
10 High St., Boston
Penna. Bldg., Philadelphia
McGlawn-Bowen Bldg., Atlanta

ESTABLISHED 1802
SCOVILL
MANUFACTURING COMPANY

Pacific Coast Sales Agents:
Engle-Reid Co.
149 California Street,
San Francisco
Terminal Sales Bldg.,
Los Angeles

Member, Copper and Brass Research Association

TRADE

ANDERSON

MARK



SLEET CUTTER
Cat. No. 18847



SLEET WHEEL
Cat. No. 18846

## Order Your Sleet Cutters, NOW

We can ship practically any quantity of Sleet Wheels or Cutters you may want, direct from stock.

But why wait until the last minute? The time to put on Sleet Wheels and Cutters is when the wire is thick with ice—and that might be any day, now.

Look over your stock and see if you have enough Cutters to take care of your needs, should a sudden sleet storm arrive.

Estimate what you want now, to see you through and write for quotations on your full winter's supply.

**Albert & J. M. Anderson Mfg. Co., 289-305 A St., Boston, Mass.**

New York—135 Broadway
Chicago—105 South Dearborn St.
Philadelphia—429 Real Estate Trust Bldg.
London, E. C. 2, England

TAYLOR-WHARTON IRON & STEEL CO.

TIOGA STEEL & IRON CO. | WM WHARTON Jr. & CO. INC. | PHILADELPHIA ROLL & MACH CO



3-WAY SWITCH LAYOUT DESIGNED FOR AN EASTERN RAILWAY

## Special Trackwork

Our facilities for the production of this work are of the highest order. Whatever traffic conditions may be, we are prepared to design the proper trackwork. Our experience embraces all the stages of street railway developement, and engineers are invited to avail themselves of it. The use of Tisco Manganese steel for trackwork originated in this company; we have developed its use to an unusually high degree of perfection.

**Wm. Wharton, Jr., & Co., Inc.**
Easton, Pa.

| Taylor-Wharton Iron & Steel Co. | Wm. Wharton Jr. & Co. | Tioga Steel & Iron Co. | Phila. Roll & Machine Co. |
|---|---|---|---|
| Plant at High Bridge, N. J. | Plant at Easton, Pa. | Plant at Philadelphia, Pa. | Plant at Philadelphia, Pa. |
| Manganese Steel Wearing Parts | Special Trackwork Cylinders for Gases | Forgings Hammered and Pressed | Rolls and Rolling Mill Machinery |

# A SAVING OF 4 to 5 POUNDS
## *per square foot*

YOU might just as well make your car floors pay for themselves, and you can do it if you use Truss Plate. Here's how—

Truss Plate, with wearing surface applied, weighs 4 to 5 pounds less per square foot than any other metal floor. That means a saving every year of 15 cents a square foot in hauling costs. Such saving will pay for Truss Plate in a short time.

In addition to its lighter weight, Truss Plate is fireproof, it has remarkable strength and unusual heat insulating quality, and covered with plastic wearing surface makes a practically indestructible floor.

## TRUSS-PLATE
## *for car flooring*



*Send for Catalog*

**Wheeling** CORRUGATING COMPANY
WHEELING W. VA.



ALLIS-CHALMERS

# Type "C"
## *Engineers' Valves for Air Brakes*

This engineers' valve has been adopted by many important railways as STANDARD, regardless of the other equipment used. Several years of commercial application has demonstrated type "C" Engineers' Valve to be superior in every respect. A few important features are graduated application positively secured at service point—quick emergency point—graduated release, if desired—very quick release at full release point—no ground joints—simple design—valve can be completely dismantled and reassembled in two minutes by removing only two nuts—etc., etc.

500,000 service applications and releases at 90 lbs. pressure show no wear on the parts.

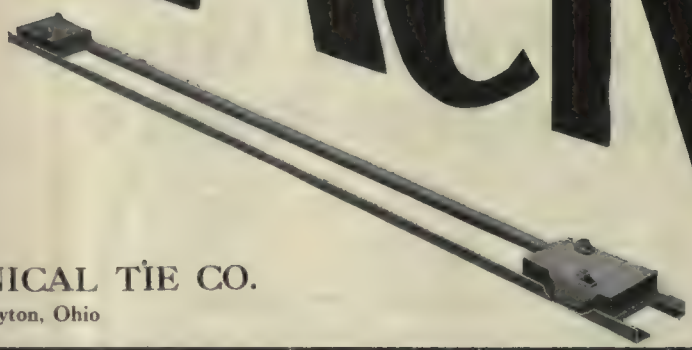
*Send for Bulletin No. 1103A.*

ALLIS-CHALMERS
MANUFACTURING COMPANY
MILWAUKEE, WISCONSIN, U.S.A.

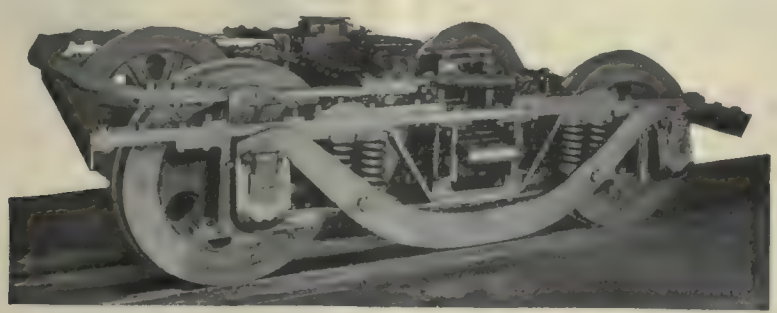
# RESILIENT TRACK

HE advantages and economies of Dayton ent Track (Dayton Resilient Ties embedded ncrete) are too many and far-reaching—too demonstrated—to be ignored or passed up .

ng a street railway can do will tend more to ote profitable operation than the installation ayton Resilient Track. *Ask us to explain.*



THE DAYTON MECHANICAL TIE CO.
707 Commercial Building, Dayton, Ohio



Type "AA" Motor Truck

## For Heavy High-Speed Electric Railway Service Baldwin Motor Trucks are Efficient and Economical

This type of Baldwin Improved Motor Truck is specially recommended on long interurban lines, where "limited" or sleeping cars are operated. It is also suitable for use under double-truck electric locomotives.

These trucks permit of easy inspection and repairs, and show low maintenance costs in operation.

Our nearest representative will furnish detailed information upon request.

## THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA, U. S. A. Cable Address, "Baldwin, Philadelphia"



# ELECTRICITY

## *If I Send You These New Books*

WILL you look them over for a week at my risk—give them a chance to show you how a few minutes a day devoted to reading them will answer your problems—help you with your daily work—raise your pay—and put you in line for a bigger job? Prove their value—then decide if you want to keep them.

### Teach Yourself at Home

These books contain every important up-to-the-minute fact about Electricity in all its branches. They're packed with new, sound, commonsense, how-to-do-it information, written by practical experts. Easy to read—easy to learn and apply. No need to take a long, expensive course of training—these books contain every thing you need to know to get and hold the best jobs. Common school education is all you need to master Electricity with these books. Order a set today for free examination.

### Learn These Vital Points

Theory and Practice of Electricity—Principles of A. C. and D. C. current. Electric machinery—Dynamo and Motor Design—Measuring and Testing Instruments—Wiring—Convertors—Rectifiers—Underwriters' Requirements—Electrical Estimating—Switchboards—Electric Railways, etc. Ready-Reference indexed for quickly locating any subject.

Electrical Engineering complete in eight big volumes—4,100 pages, 3,300 pictures, charts, diagrams, blue-prints, etc. Flexible binding. Gold stamped.

### SEND NO MONEY!

Just the coupon. Look the books over a full week with our compliments—then decide. No obligation to buy unless you are satisfied and want to keep them. Send coupon now—today and get this master electrical set. Pay only $3.00 monthly if you decide to keep them.

AMERICAN TECHNICAL SOCIETY
Dept. E. 954 CHICAGO, U.S.A.

## FREE TRIAL

AMERICAN TECHNICAL SOCIETY,
Dept. E. 954 Chicago, U. S. A.

Please send me the 8 volume cyclopedia of ELECTRICAL ENGINEERING for free examination. If satisfactory I will send you $2.80 within 7 days, and $3.00 monthly for nine months.

Name _____

Address _____

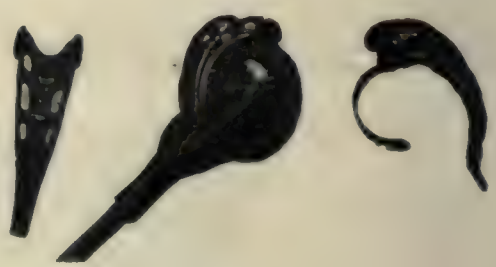
Employed by _____



# SLEET CUTTING DEVICES



Nuttall Sleet Wheels replace the standard trolley wheels and efficiently clean sleet coated wires.



Nuttall Sleet Scrapers hook over the trolley wheel — can be attached instantly, and clean the wire thoroughly. Don't wait for a sleet storm—order *today*.

## R.D. NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.



These attractive one-man, double-truck safety cars were delivered to the Helena (Mont.) Light & Railway Co.

*Another lot built by the*

**PERLEY A. THOMAS CAR WORKS**

**High Point, N. C.**

"THOMAS-BUILT" cars are going far and wide in ever-increasing numbers.

Why do distant traction companies come to High Point, North Carolina, for new cars? Because "Thomas-built" cars are built with an individual care and attention to details which insures attractive finish throughout and a long life of satisfactory service. Furthermore Perley A. Thomas' prices and quick deliveries appeal to the railway field.

***Let us quote on your new cars.***

**R. H.**

**TAYLOR REDUCED HEIGHT TRUCK**

**S. WITH A.**

**TAYLOR STRAIGHT ACTION BRAKE**



**SMOOTH RIDING**

**LOW MAINTENANCE COST—Absolute Safety**

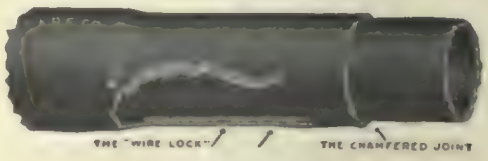
**Center Plate Height 22¾ in. with 26 in. Diam. Wheels**

For Modern Low Level Double Truck Cars, the Taylor R. H. Truck, equipped with Taylor S. A. Brake, with large diameter hard steel pins, will provide the best possible service results from every standpoint.

**TAYLOR ELECTRIC TRUCK CO., TROY, N. Y.**

SPECIFICATIONS ON REQUEST Established 1892 SEND FOR PORTFOLIO

## ELRECO TUBULAR POLES




COMBINE

Lowest Cost — Lightest Weight
Least Maintenance — Greatest Adaptability

Catalog complete with engineering data sent on request.

ELECTRIC RAILWAY EQUIPMENT CO.
CINCINNATI, OHIO
New York City, 30 Church Street



AIMco
Electric Railway Automatic Signals
for Accessibility and Reliability
EST 1888 AIMco INC. 1907
"American" INSULATING MACHINERY COMPANY
Philadelphia, New York, Paris, England
Sales Agents:
Electric Service Supplies Co.
Philadelphia New York Chicago

## AUTOMATIC SIGNALS

Highway Crossing Bells
Headway Recorders
Flasher Relays

NACHOD SIGNAL COMPANY, INC.
LOUISVILLE, KENTUCKY.





## U. S. ELECTRIC AUTOMATIC SIGNAL

for single track block signal protection

United States Electric Signal Co.
West Newton, Mass.

AMERICAN ELECTRICAL WORKS — AMELECTRIC — Wires and Cables — PHILLIPSDALE, R.I.
Reg. U. S. Pat. Office
Incandescent Lamp Cord

## AMELECTRIC PRODUCTS

BARE COPPER WIRE AND CABLE
TROLLEY WIRE
WEATHERPROOF WIRE AND CABLE
PAPER INSULATED UNDERGROUND CABLE
MAGNET WIRE

AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.
Boston, 176 Federal; Chicago, 113 W. Adams; Cincinnati, Traction Bldg.; New York, 100 E. 42nd St.

## Shaw Lightning Arresters

*Standard in the Electric Industries for 35 years*

Henry M. Shaw
*150 Coit St., Irvington, Newark, N. J.*

Lapp Insulators
Lapp Insulator Co. Inc. LeRoy, N.Y.
Trade Mark

## Chapman Automatic Signals

Charles N. Wood Co., Boston



## STANDARD

wires and cables are guaranteed by 43 years of successful service. They are standard in quality as in name. Made by the Standard Underground Cable Co. Pittsburgh, Pa. Branches in all principal cities.

## ANACONDA TROLLEY WIRE

ANACONDA COPPER MINING COMPANY
Conway Building, Chicago, Ill.
THE AMERICAN BRASS COMPANY
General Offices, Waterbury, Conn.

## RAMAPO AJAX CORPORATION

Ramapo Automatic Return Switch Stands for Passing Sidings

RACOR
TRADE MARK

RACOR Tee Rail Special Work
Manganese Construction

GENERAL OFFICES: HILBURN, NEW YORK
Chicago New York Superior, Wis. Niagara Falls, N. Y.
Canadian Ramapo Iron Works, Ltd., Niagara Falls, Ont.

ROEBLING

WELDING CABLE
ELECTRICAL WIRES and CABLES
John A. Roebling's Sons Company, Trenton, N. J.

## Hubbard Trolley Pole Bands

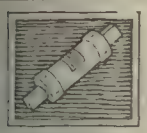

Split

Made of Open Hearth Steel. Galvanized by the Double-Dip process.
Your best insurance for long service and durability.
*Ask Your Jobber*


Solid

HUBBARD & COMPANY
Pittsburgh Chicago

P Products of interest to Electric Railways


NOARK Fuses


NOARK Fuse Clips CUTOUT BASES


NOARK Service and Underground Boxes


Railway and Mine Hangers and Insulators


J-P Welding Service [Contract Basis]


VULCABESTON Sheet and Rope Packing

OHNS-PRATT CO. HARTFORD, CONN.

BUDA
ESTABLISHED
1881

Special Track Work of every description

THE BUDA COMPANY
Harvey (Suburb Chicago) Illinois

American Rail Bonds

GROWN
UNITED STATES
TWIN TERMINAL
SOLDER
TRIPLEX

Arc Weld and Flame Weld

*Send for new Rail Bond Book*

American Steel & Wire Company
CHICAGO
NEW YORK

Lorain Special Trackwork
Girder Rails

*Electrically Welded Joints*

THE LORAIN STEEL COMPANY
Johnstown, Pa.

*Sales Offices:*
tlanta Chicago Cleveland New York
Philadelphia Pittsburgh
*Pacific Coast Representative:*
United States Steel Products Company
os Angeles Portland San Francisco Seattle
*Export Representative:*
United States Steel Products Company, New York, N. Y.

"CARNEGIE"
for
WHEELS
AXLES
RAILS
CROSS TIES



Carnegie Steel Company
PITTSBURGH, PENNA.

SPECIALISTS
in the
Design and Manufacture
of
*Standard—Insulated—and Compromise Rail Joints*

The Rail Joint Company
61 Broadway, New York City

High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS
COMPLETE LAYOUTS
IMPROVED ANTI-KICK BIG-HEEL SWITCHES
HARD CENTER AND MANGANESE CONSTRUCTION

New York Switch & Crossing Co.
Hoboken, N. J.

# THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

**Builders since 1868 of Water Tube Boilers of continuing reliability**

BRANCH OFFICES

BOSTON, 49 Federal Street
PHILADELPHIA, Packard Building
PITTSBURGH, Farmers Deposit Bank Building
CLEVELAND, Guardian Building
CHICAGO, Marquette Building
CINCINNATI, Traction Building
ATLANTA, Candler Building
PHOENIX, ARIZ., Heard Building
DALLAS, TEX., 2001 Magnolia Building
HONOLULU, H. T., Castle & Cooke Building
PORTLAND, ORE., 305 Gasco Building

THE BABCOCK & WILCOX COMPANY — STEAM

WORKS

Bayonne, N. J.
Barberton, Ohio

**Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893**

BRANCH OFFICES

DETROIT, Ford Building
NEW ORLEANS, 521-5 Baronne Street
HOUSTON, TEXAS, Southern Pacific Building
DENVER, 435 Seventeenth Street
SALT LAKE CITY, 405-6 Kearns Building
SAN FRANCISCO, Sheldon Building
LOS ANGELES, 404-6 Central Building
SEATTLE, L. C. Smith Building
HAVANA, CUBA, Calle de Aguiar 104
SAN JUAN, PORTO RICO, Royal Bank Building

# We are prepared

to handle any high grade proposition where

**VARNISHED CAMBRIC**

**Wires and Cables**

are required.

When using *quality* Wires and Cables use *quality* Tapes.

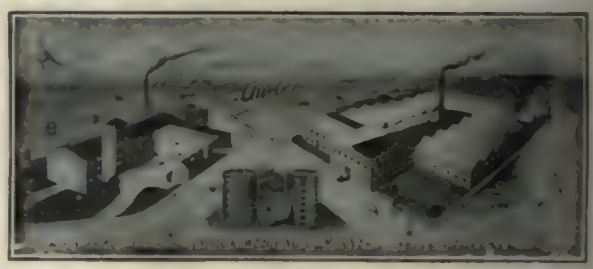
"MANSON" Tape, "OKONITE" Tape, "DUNDEE" Tapes.

**THE OKONITE CO., Passaic, N. J.**

Incorporated 1884

OKONITE — TRADE MARK

*Sales Offices: New York—Atlanta—Pittsburgh—San Francisco.*
*Agents:* Central Electric Co., Chicago, Ill. Pettingell-Andrews Co., Boston, Mass.; The F. D. Lawrence Electric Co., Cincinnati, Ohio; Novelty Electric Co., Philadelphia, Pa.
*Canadian Representatives:* Engineering Materials Limited, Montreal.



**Use only Awebco Tape on your Armatures**

Field Coils have better protection when wound with "AWEBCO Tape." Send for samples.

**ANCHOR WEBBING COMPANY**

300 Brook Street, Pawtucket, Rhode Island

# Standard of Quality




Quality is the total of good materials and careful manufacture.

That is why, for 40 years, manufacturers of electrical apparatus have found HOPE tapes to be the Standard of Quality.

Let us send you the HOPE Sample Booklet

**Electric Tape**

**HOPE WEBBING COMPANY, INC.**

PROVIDENCE, RHODE ISLAND
New York Troy Chicago

THE WORLD'S STANDARD

# "IRVINGTON"

Black and Yellow
Varnished Silk, Varnished Cambric, Varnished Paper

Irr-O-Slot Insulation Flexible Varnished Tubing
Insulating Varnishes and Compounds

**Irvington Varnish & Insulator Co.**

Irvington, N. J.

*Sales Representatives in the Principal Cities*

FERALITE

**ALUMINO-THERMIC JOINTS**

New and independent process. No inserts needed. Up-to-date and economical.

**Alumino-Thermic Corp., Roselle Park, N. J.**

**A Single Segment or a Complete Commutator**

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

**Cameron Electrical Mfg. Co., Ansonia, Connecticut**

**ECONOMIZERS**

reduce fuel costs by making use of waste exhaust gases to preheat the boiler feed. Patented construction proven by 30 years of service.

# FOSTER

**SUPERHEATERS**

improve engine, turbine and boiler economy by enabling a given amount of steam to do more work. Over 10,000 installations in stationary power plants.

**POWER SPECIALTY CO.,** Boston, Phila., Pitts., Detroit, Kans. City, Chicago, San Fran., Los Angeles, Boulder, Dallas, London 111 Broadway, NEW YORK

Play for safety—
*plus resiliency—*
*plus long life*
*By specifying*
FORT PITT SPRINGS
FORT PITT SPRING & MFG. CO.
Pittsburgh, Pa.




B. A. HEGEMAN, Jr., President — C. C. CASTLE, First Vice-President
H. A. HEGEMAN, Vice-Pres. and Treas. — F. T. SARGENT, Secretary
W. C. PETERS, Manager Sales and Engineering

National Railway Appliance Co.

Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., New York
Munsey Bldg., Washington, D. C. — 100 Boylston St., Boston, Mass.
Hegeman-Castle Corporation, Railway Exchange Building, Chicago.

RAILWAY SUPPLIES

Tool Steel Gears and Pinions
Bell Locked Fare Box and Change Maker
The Aluminum Field Coils
Walter Tractor Snow Plows
Cutler-Hammer Electric Heaters
Pittsburgh Forge & Iron Co.'s Products
Genesco Paint Oils
B. Z. Car Control Corporation's Safety Devices
Garland Ventilators
Fiberlinum Insulation
Yellow Coach Mfg. Co.'s Single and Double Deck Busses
Economy Electric Devices Co.'s Power Saving and Inspection Meters
Anglo-American Varnish Co. Varnishes, Enamels, etc.
Gilmer Multiple Safety Step Treads
National Hand Holds
Ft. Pitt Spring & Mfg. Co., Springs
Turnstile Car Corporation's Turnstiles
Anderson Slack Adjusters
Feasible Drop Brake Staffs
Dunham Hopper Door Device

PERFECT MICANITE INSULATOR
Reg. U. S. Pat. Off.

ELECTRICAL INSULATION

Micanite armature and commutator insulation, commutator segments and rings, plate, tubes, etc., Empire oiled insulating materials; Linotape; Kablak; Mico; and other products—for the electrical insulating requirements of the railway.

*Catalogs will gladly be furnished*

MICA INSULATOR COMPANY
*Sole Manufacturers of Micanite*
*Established* 1893
68 Church St., New York — 542 So. Dearborn St., Chicago
Works: Schenectady, N. Y.
8-F




*Service is P. T. L's STANDARD*

Let us help you maintain yours by progressive inspection of the cars, rails, track fastenings, creosoted materials, etc. you buy.

***Our bulletin No. 28 tells how we do it—shall we send you a copy?***

PITTSBURGH TESTING LABORATORY
*Inspection Engineers and Chemists*
PITTSBURGH, PENNA.
*Branch Offices in the Principal Cities*

RAZED. Rail Bonds ARC WELD
Portable Arc Welding Outfits
The Electric Railway Improvement Co.
Cleveland, Ohio

GALVANIZING
HOT DIP

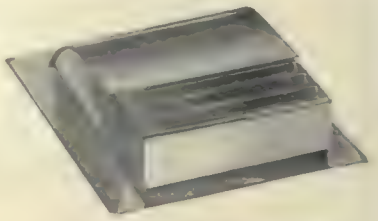
We have the largest jobbing galvanizing plant and kettles in the United States. We guarantee our galvanizing to stand eight one minute dips in the Standard Copper Sulphate Solution Test. *Galvanized Products furnished.*

JOSEPH P. CATTIE & BROTHERS
Gaul and Letterly Sts., Philadelphia, Penna.

TULC
A LUBRICANT

We make a specialty of
ELECTRIC RAILWAY LUBRICATION
We solicit a test of TULC on your equipment
**The Universal Lubricating Co.**
Cleveland, Ohio
Tulc, Inc., Eastern Representative,
1617 Gotham National Bank Bldg., New York City

## Some people would rather walk than breathe bad air—



N-L Type "C" Arch Roof Ventilator

And you can't blame them. Nothing is so unpopular as an ill-smelling, stuffy street car or bus. Passengers like warm air in cold weather, but it must be fresh. Poor ventilation drives them away. Good ventilation attracts them.

N-L Ventilators keep the air pure in street cars and buses by giving many complete changes every hour. No drafts, dust, rain or snow. "One-way" air traffic only—and that fresh air.

N-L

*Our booklet "Superior Ventilation" tells all about them. Ask for it.*

**THE NICHOLS-LINTERN CO.**
7960 Lorain Ave., Cleveland, Ohio
Represented in Canada by Railway & Power Engineering Corp., Toronto, Ontario




Double Register

*Both our latest single and double registers are now equipped for electric as well as mechanical hand or foot operation.*

## Full Electric Operation of Fare Registers

A completely satisfactory fare registration system is one that has the confidence of the public, the conductor and the accounting department. The simplicity and accuracy of International Registers maintained for more than thirty years, is combined in the later types with the extra speed and convenience of electric operation.

**The International Register Co.**
15 South Throop St., Chicago
Exclusive Selling Agents for HEEREN Enamel Badges



The Zone System of Fares is Successfully Collected with the Aid of

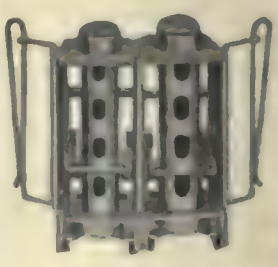
## CLEVELAND FARE BOXES

*Let Us Give You Particulars*

**The Cleveland Fare Box Co.**
Cleveland, Ohio
Canadian Cleveland Fare Box Co., Ltd., Preston, Ont.

Coin Counting and Sorting Machines. Change Carriers

## JOHNSON Universal Changer



**Adjustable**
The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

**Flexible**
Each barrel a separate unit permitting the conductor to interchange the barrels to suit his personal requirements and to facilitate the addition of extra barrels

**JOHNSON FARE BOX COMPANY**
Ravenswood, Chicago, Ill.

## HIGH SPEED CHANGE CARRIERS

1924 model —without rivets— ready for delivery




Supplied in one or four tube Combinations

Essential wherever the rapid and accurate handling of change is required. Now included in the standard equipment of largest Traction Companies because conductors demand them.

*Prices and Literature sent on request*

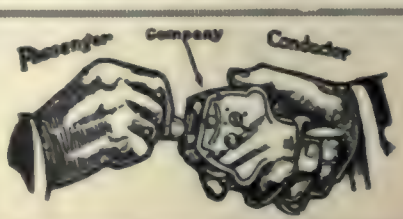
**J. L. GALEF, 75 Chambers St., N. Y. C.**
Exclusive Manufacturer's Selling Agent



*Gets Every Fare*
## PEREY TURNSTILES or PASSIMETERS

Use them in your Prepayment Areas and Street Cars

**Perey Manufacturing Co., Inc.**
101 Park Avenue, New York City




**Direct Automatic Registration By the Passengers**

**Rooke Automatic Register Co.**
Providence, R. I.

"Tool Steel"

HELICALS

are just as superior in quality as

"Tool Steel"

SPURS.

Tool Steel Quality

The Tool Steel Gear and Pinion Co.

CINCINNATI, O.

Helical gears licensed under patent May 20th, 1923



Why Hire 20 Men When 1 Will Do!

Universal Cranes are *One Man Operated* 4 to 5 ton capacity gasoline or electric full revolving locomotive cranes that can be mounted on used motor trucks or flat cars.

Many leading street Railway Properties own them. Labor saving and reliability are the reasons why. Ask for complete facts now.

*Wire or Write for Bul. 201-P*

The Universal Crane Co.
904-Swetland Bldg., Cleveland

UNIVERSAL

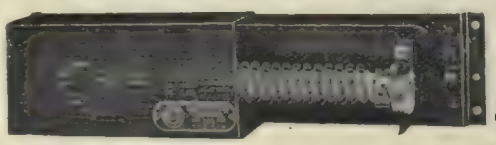
SAMSON SPOT WATERPROOFED TROLLEY CORD

Trade Mark Reg. U. S. Pat. Off.

Made of extra quality stock firmly braided and smoothly finished. Carefully inspected and guaranteed free from flaws. Samples and information gladly sent.

SAMSON CORDAGE WORKS, BOSTON, MASS.

...NEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



No. 478E

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.

PANELYTE

HEADLININGS

THE PANELYTE COMPANY, Trenton, N. J.

Heywood-Wakefield

CAR SEATS

of pressed Steel for all Classes of Passenger Service. Rattan for covering seats and for snow sweepers.

HEYWOOD-WAKEFIELD CO.
Factory at Wakefield, Mass.
Offices at New York, Chicago, San Francisco

For detailed description — see — CAR BUILDERS CYCLOPEDIA 1922 Edition

PS HEATERS

Car Heating and Ventilation

are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

The Peter Smith Heater Company
6209 Hamilton Ave., Detroit, Mich.

HASKELITE

Moulded roofs are furnished in sections best suited to the car builder. They increase the strength, reduce weight and labor costs of your cars.

PLYMETL girder panels armour the sides against blows. They weigh less than 16 gauge steel, reduce vibration and rumbling. Send for blueprint booklet.

HASKELITE MANUFACTURING CORPORATION
133 W. Washington Street, Chicago

HALE-KILBURN
CAR SEATS
*For Every Class of Service*

General Offices and Works: Philadelphia
Offices: New York, Chicago, St. Louis, Washington, San Francisco

RAILWAY UTILITY COMPANY

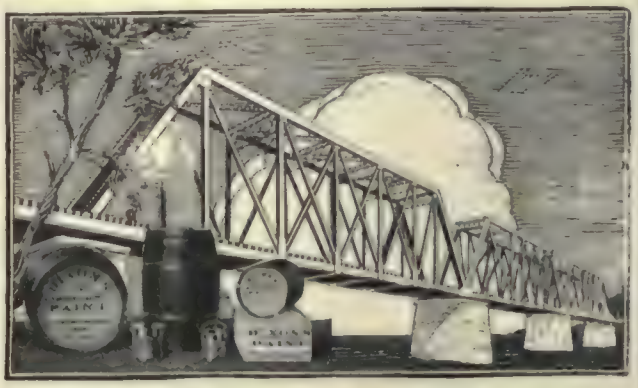
CAR COMFORT WITH UTILITY

HEATERS
REGULATORS
VENTILATORS

141-151 West 22d St. Chicago, Ill.

*Write for Catalogue*

1328 Broadway New York, N. Y.



## WHY DIXON'S LASTS

Dixon's Silica-Graphite Paint owes its longevity to the vehicle used, boiled linseed oil, and the peculiar pigment, flake silica-graphite. It is an accepted fact that the best vehicle for protective paint is linseed oil.

A paint will last only as long as the vehicle stands up.

That is the reason Dixon's Silica-Graphite Paint costs more per gallon—only pure boiled linseed oil is used.

The pigment in Dixon's Silica-Graphite Paint is a peculiar natural combination of silica and flake graphite. Silica provides the necessary wear-resisting qualities to the pigment while the flake graphite imparts its water-repellent.

Write for our Booklet-B, "The Philosophy of Protective Paint." It shows clearly how and why Dixon's Silica-Graphite Paint is the cheapest per year of service.

**JOSEPH DIXON CRUCIBLE COMPANY**
JERSEY CITY, N. J. Established 1827



## THE RUSH HOUR

holds no terrors for you or your passengers if your rolling stock keeps rolling...

## AJAX BULL BEARING ALLOY

will keep bearings and passengers cool. Stays on the job for a long time.



**The Ajax Metal Company**
ESTABLISHED 1880
PHILADELPHIA
New York Chicago Boston Cleveland

# If there is anything you want—

or something you don't want that *other* readers of this paper can supply—or use—advertise in the

## Searchlight Section

*NOW*— is the time to offer good second-hand equipment or machinery for sale. The demand is great for good plant for immediate delivery. That's why you should advertise NOW.

*NOW*— or any other time, use the Searchlight Section for advertising

| | | | |
|---|---|---|---|
| Agencies Wanted | Contracts Wanted | Miscellaneous Wants | Positions Wanted |
| Agents Wanted | Educational Courses | New Industries Wanted | Property For Sale |
| Auction Notices | Employment Agencies | Partners Wanted | Receivers' Sales |
| Buildings For Sale | Exchanges | Patents For Sale | Representatives Wanted |
| Business Opportunities | For Rent Items | Patent Attorneys | Salesmen Wanted |
| Civil Service Opportunities | Franchises | Plants For Sale | Work Wanted |
| Contracts To Be Let | Industrial Sites | Positions Vacant | Etc., Etc., Etc. 35 |

**Northern CEDAR POLES Western**
We guarantee
all grades of poles; also any butt-treating specifications
**BELL LUMBER COMPANY**
Minneapolis, Minn.

100 New Users in the Last Nine Months
**KASS SAFETY TREADS**
HIGH
in efficiency and lasting qualities
LOW
in weight, initial and upkeep costs
Morton Manufacturing Co., Chicago

**PROVIDENCE FENDERS** **H-B LIFE GUARDS**
The Consolidated Car Fender Co., Providence, R. I.
Wendell & MacDuffie Co., 110 E. 42nd St., New York
General Sales Agents



**STUCKI SIDE BEARINGS**
A. STUCKI CO.
Oliver Bldg.
Pittsburgh, Pa.



## Complete satisfaction

Operating perfectly and requiring minimum attention for maintenance and lubrication, Earll Catchers and Retrievers give genuinely satisfactory results. Their refinement of design, and mechanical superiority are summarized in the following five features, peculiar to Earll construction.

**No-wear Check Pawl**
**Free-Winding Tension Spring**
**Ratchet Wind**
**Emergency Release**
**Perfect Automatic Lubrication**

Earll Catchers and Retrievers

**C. I. EARLL, York, Pa.**





*"Differential Two-Car Train. Trailer dumping load clear of trench."*

## DIFFERENTIAL CARS

**Standard on Fifty Railways for**

| | |
|---|---|
| **Track Maintenance** | **Track Construction** |
| **Ash Disposal** | **Hauling Crossties** |
| **Placing Ballast** | **Disposal of Waste** |
| **Coal Hauling** | **Snow Disposal** |

**Concrete Materials to the Job**
**Excavated Material to the Dump**

***For Economy***

THE CLARK CONCRETE BREAKER
THE DIFFERENTIAL BOTTOM DUMP CAR
THE DIFFERENTIAL COMBINATION CAR-WHEEL TRUCK and TRACTOR

**THE DIFFERENTIAL STEEL CAR CO.**
**Findlay, Ohio, U. S. A.**



*You're having brush trouble*

**CORRECT IT**

**USE LE CARBONE CARBON BRUSHES**

*They talk for themselves*

**COST MORE PER BRUSH**
**COST LESS PER CAR MILE**

W. J. Jeandron
345 Madison Avenue, New York

Pittsburgh Office: 634 Wabash Bldg.
Chicago Office: 1657 Monadnock Block
San Francisco Office: 525 Market Street
Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal and Toronto



# BRAKE SHOES

## AERA Standards
## Brake Heads



Diamond "S" Steel Back and Lug Shoes best for all equipment.

Manufactured and sold under U. S. Patent and Registered Trade Mark.

**American Brake Shoe and Foundry Co.**
**30 Church Street, New York**

**332 So. Michigan Ave., Chicago**

## The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



**THE STAR BRASS WORKS**
KALAMAZOO, MICH., U. S. A.




*Defective Wheels Corrected While They Run*

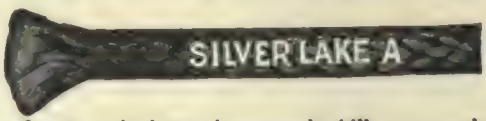
## WHEEL TRUING BRAKE SHOES

—keep your cars and wheels in service. Abrasive blocks in various sections correct flattening or wear on any part of flange or tread. Write for booklet.

**Wheel Truing Brake Shoe Co.**
Detroit, Mich.

Trade Mark—Wheel Truing Brake Shoe

## Waterproofed Trolley Cord




Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

**FOR POSITIVE SATISFACTION ORDER SILVER LAKE**

If you are not familiar with the quality you will be surprised at its ENDURANCE and ECONOMY.

*Sold by Net Weights and Full Lengths*

**SILVER LAKE COMPANY**
*Manufacturers of bell, signal and other cords.*
Newtonville, Massachusetts

"Axle Specialists Since 1866"
Address all Mail to Post Office Box 515, Richmond, Va.

## CAR AXLES
**J. R. JOHNSON AND CO., INC.**

FORGED STEEL AXLES

For Locomotives, Passenger, Freight and Electric Cars
Smooth Forged or Rough Turned—Carbon or Alloy Steel—Plain or Heat Treated, Forged and Turned Piston Rods, Crank Pins, Large Shafts, Round Bars, etc.

For better Axles Specify
## "VALSCO"
## HEAT TREATED CAR AXLES
## LACLEDE STEEL CO.
Arcade Bldg. St. Louis, Mo.

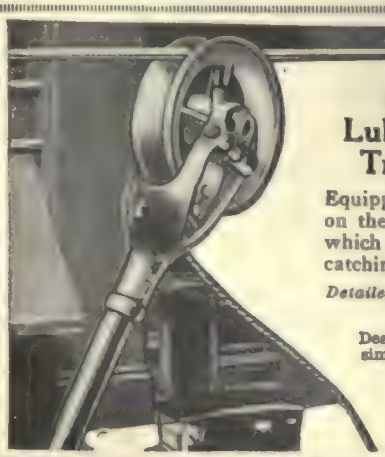
## McGuire-Cummings Manufacturing Co.



General Offices:
111 W. Monroe St., Chicago, Ill.

**Street Cars**
**Trucks**
**Snow Sweepers**





## M-J No. 10 Lubricated Type Trolley Wheel

Equipped in our No. 6 harp on the bottle-shape principle which prevents fouling or catching overhead lines.

*Detailed information and prices on request.*

Designed for high speed, simplicity and economy

**More-Jones Brass & Metal Co.**
St. Louis, Mo.



## CHILLINGWORTH
**One-Piece Gear Cases**

Seamless—Rivetless—Light Weight
Best for Service—Durability and Economy. *Write Us.*

**Chillingworth Mfg. Co.**
Jersey City, N. J.

## THE SEARCHLIGHT SECTION

*will locate the*
Man you want
Position you want
Equipment you want

*Are you using the Searchlight?*

# SEARCHLIGHT SECTION

## USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD:

*Positions Wanted*, 4 cents a word, minimum 75 cents an insertion, payable in advance.

*Positions Vacant* and all other classifications, 8 cents a word, minimum charge $2.00.

*Proposals*, 40 cents a line an insertion.

INFORMATION:

*Box Numbers* in care of any of our offices count 10 words additional in undisplayed ads.

*Discount* of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED RATE PER INCH:

1 to 3 inches.....$4.50 an inch
4 to 7 inches..... 4.30 an inch
8 to 14 inches..... 4.10 an inch

Rates for larger spaces, or yearly rates, on request.

*An advertising inch* is measured vertically on one column, 3 columns—30 inches—to a page.

E.F.J.

### POSITION VACANT

ARMATURE winder to act as foreman of car and motor repair shop in New England. State fully experience, age, salary, etc. P-760 Electric Railway Journal, 10th Ave. and 36th St., New York.

SHOP foreman wanted for electric railway in New England. Give experience, reference, age and salary expected in first letter. P-752, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

### POSITIONS WANTED

AUDITOR, broad and thorough experience in financing and accounting; all branches railway, electric and gas utilities, open for engagement. Possess initiative and capable of assuming full control of all accounting matters. PW-758, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT—City or interurban; twelve years' successful experience in maintenance, operation and public relations. PW-757, Electric Railway Journal, 10th Ave. at 36th St., New York.

TRAFFIC and transportation superintendent—Experienced interurban and city railway and bus operation, desire to connect with organization inaugurating bus service. PW-759, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.


**Relaying Rails**
NEW RAILS - ACCESSORIES

See our full page announcement on page 39.

1 Ton or 1000

LEBANON PITTSBURGH, PA. NEW YORK CITY
JERSEY CITY PHILADELPHIA HAMILTON, O.



FOR SALE

200 New Jones & Laughlin

**Cold Rolled Steel Axles**

3¾ in. diam. 6 ft. 5¼ in. long. Apply to Purchasing Agent,

**Boston Elevated Railway**
Park Square Building, Room 731.
31 St. James Avenue, Boston



# FOR SALE Standard Gauge Electric Railway Equipment

1—Parlor Chair Car, built by American Car Company, length 48-ft.—seating capacity 40—fully equipped air brakes, electric heating system. Brill standard double trucks, 65-hp. motors. Type M Controller.

6—Interurban Passenger Cars, built by American Car Company, length of cars 49-ft., seating capacity 50, fully equipped air brakes. Electrical equipment 4 G.E.—67—40-hp. motors and K-6 controllers. Smith heaters and Brill standard double trucks.

1—Express Car built by American Car Company, length 50-ft., equipped with air brakes, stove heat. Brill standard double trucks. Electrical equipment 4 G.E.—67—40-hp. motor and K-28 controller.

1—Line Car, 24-ft. long. Electrical equipment consists of 2 G.E.—1000—35-hp. motors and K-10 controller.

Cars in splendid condition, finished in both rattan and plush. For quick sale, we offer these Cars at $3000 each, f.o.b. cars. Write at once for detailed specifications. Located in Chicago District. Inspection invited.

**HYMAN-MICHAELS COMPANY**
*Rails, Locomotives and Cars*
Main Office—CHICAGO—Peoples Gas Bldg.
District Offices: New York, Pittsburgh, St. Louis, San Francisco



# RECEIVER'S SALE

of all property of the

**Milford, Attleborough & Woonsocket Street Railway Company**

Consisting of Power Station Building and Machinery, Park Property, known as "Silver Lake Park." Car House and Equipment, Boarding House and Tenement Houses, Track and overhead trolley and feed wires located in the towns of Milford, Bellingham, Franklin and Wrentham; Massachusetts, 28 Passenger and Service Cars.

Bids are solicited for all or any part of the above to be received not later than January 8, 1925

*Copies of Inventory of the property will be sent upon request.*

**CLARK V. WOOD, *Receiver***
145 State Street, Springfield, Mass.



WE WANT TO BUY
30—West. 306-C.V.-4
**MOTORS**
Have you any to offer?
ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.



FOR SALE
**MOTORS**
20—G.E. 210 Standard Railway Motors.
*Excellent Shape*
TRANSIT EQUIPMENT COMPANY
501 Fifth Ave., New York



425 TONS—No. 1
**80 LB. RELAYING RAILS**
EXCEPTIONALLY FINE SHAPE
*Immediate Shipment—Low Price*
ZELNICKER IN ST. LOUIS



FOR SALE
**Three Trolley Cars**
Double end operation—42 feet overall—seating capacity 44.
MONSANTO CHEMICAL WORKS
St. Louis, Missouri

# WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

**Advertising, Street Car**
Collier, Inc., Barron G.

**Air Receivers, Aftercoolers**
Ingersoll-Rand Co.

**Anchors, Guy**
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

**Armature Shop Tools**
Elec. Service Supplies Co.

**Automatic Return Switch Stand**
Ramapo Ajax Corp.

**Automatic Safety Switch Stands**
Ramapo Ajax Corp.

**Axles**
Bemis Car Truck Co.
Johnson & Co., J. R.
Laclede Steel Co.
St. Louis Car Co.
Taylor Elec. Truck Co.

**Axles, Bus**
Standard Steel Co.

**Axle Straighteners**
Columbia M. W. & M. I. Co.

**Axles, Car Wheel**
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Johnson & Co., J. R.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.

**Babbitt Metal**
Ajax Metal Co.

**Badges and Buttons**
Elec. Service Supplies Co.
International Register Co., The

**Batteries, Dry**
Nichols-Lintern Co.

**Bearings and Bearing Metals**
Ajax Metal Co.
Bemis Car Truck Co.
General Electric Co.
More-Jones Brass & Metal Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.

**Bearings, Center and Roller Side**
Baldwin Locomotive Wks.
Stucki Co., A.

**Bells and Gongs**
Brill Co., The J. G.
Consolidated Car Heating Co.
Elec. Service Supplies Co.

**Benders, Rail**
Railway Track-work Co.

**Bodies, Bus**
Superior Motor Coach Body Co.
Auto Body Co.

**Boiler Tubes**
Nat'l Tube Co.

**Boilers**
Babcock & Wilcox Co., The

**Bond Testers**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.

**Bonding Apparatus**
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Track-work Co.
Rail Welding & Bonding Co.

**Bonds, Rail**
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Rail Welding & Bonding Co.
Westinghouse Elec. & M. Co.

**Boxes, Switch**
Johns-Pratt Co.

**Brackets and Cross Arms (See also Poles, Ties, Posts etc.)**
American Bridge Co.
Bates Expanded Steel Truss Co.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

**Brake Adjusters**
Nat'l Ry. Appliance Co.
Westinghouse Tr. Br. Co.

**Brake Shoes**
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Taylor Electric Truck Co.
Wheel Truing Brake Shoe Co.

**Brakes, Brake Systems and Brake Parts**
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
General Electric Co.
National Brake Co.
Taylor Electric Truck Co.
Westinghouse Tr. Br. Co.

**Brushes, Carbon**
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Stackpole Carbon Co.
Westinghouse Elec. & M. Co.

**Brush Holders**
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

**Brushes, Wire Pneumatic**
Ingersoll-Rand Co.

**Bulkheads**
Haskelite Mfg. Co.

**Bunkers, Coal**
American Bridge Co.

**Buses, Motor**
Brill Co., The J. G.
International Motor Co.
N. Y. Transportation Co.
St. Louis Car Co.

**Bushings, Case Hardened and Manganese**
Bemis Car Truck Co.
Brill Co., The J. G.

**Cables**
(See Wires and Cables)

**Calculating Machines**
W. A. Morschhauser

**Cambric Tapes, Yellow & Black Varnish**
Irvington Varnish & Ins. Co.

**Cambric Yellow & Black Varnish**
Mica Insulator Co.

**Carbon Brushes**
(See Brushes, Carbon)

**Car Flooring**
Wheeling Corrugated Co.

**Car Lighting Apparatus**
Elec. Service Supplies Co.

**Car Panel Safety Switches**
Consolidated Car Heating Co.
Westinghouse Elec. & M. Co.

**Car Wheels, Rolled Steel**
Bethlehem Steel Co.

**Cars, Dump**
Differential Steel Car Co., Inc.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

**Cars, Gas Rail**
St. Louis Car Co.

**Cars, Passenger, Freight Express, etc.**
American Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Thomas Car Wks., Perley A.
Wason Mfg. Co.

**Cars, Second Hand**
Electric Equipment Co.
Transit Equipment Co.

**Cars, Self-Propelled**
General Electric Co.

**Castings, Brass, Composition or Copper**
Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.
More-Jones Brass & Metal Co.

**Castings, Funnel**
Wharton, Jr. & Co., Inc., Wm.

**Castings, Gray Iron and Steel**
American Bridge Co.
Bemis Car Truck Co.

**Castings, Malleable and Brass**
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.

**Catchers and Retrievers, Trolley**
Earll, C. L.
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

**Catenary Construction**
Archbold-Brady Co.

**Change Carriers**
Cleveland Fare Box Co.
Galef, J. L.

**Circuit Breakers**
General Electric Co.
Westinghouse Elec. & M. Co.

**Clamps and Connectors for Wires and Cables**
Anderson Mfg. Co., A. M. & J. M.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Westinghouse Elec. & M. Co.

**Cleaners and Scrapers, Track (See also Snow-Plows, Sweepers and Brooms)**
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
Ohio Brass Co.

**Clusters and Sockets**
General Electric Co.

**Coal and Ash Handling (See Conveying and Hoisting Machinery)**

**Coils, Armature and Field**
Economy Electric Devices Co.
General Electric Co.
Westinghouse Elec. & M. Co.

**Coil Banding and Winding Machines**
Electric Service Sup. Co.
Westinghouse Elec. & M. Co.

**Coils, Choke and Kicking**
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

**Coin-Counting Machines**
Cleveland Fare Box Co.
Galef, J. L.
International Register Co. The
Johnson Fare Box Co.

**Coin Sorting Machines**
Cleveland Fare Box Co.
Galef, J. L.

**Coin Wrappers**
Cleveland Fare Box Co.
Galef, J. L.

**Commutator Slotters**
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

**Commutator Truing Devices**
General Electric Co.

**Commutators or Parts**
Cameron Elec'l Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

**Compressors, Air**
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.

**Compressors, Air, Portable**
Ingersoll-Rand Co.

**Compressors, Gas**
Ingersoll-Rand Co.

**Concrete Reinforcing Bars**
Laclede Steel Co.

**Condensers**
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll Rand Co.
Westinghouse Elec. & M. Co.

**Condenser Papers**
Irvington Varnish & Ins. Co.

**Conduits, Underground**
Std. Underground Cable Co.

**Connectors, Solderless**
Westinghouse Elec. & M. Co.

**Connectors, Trailer Car**
Consolidated Car Heating Co.
Elec. Service Supplies Co.
Ohio Brass Co.

**Controllers or Parts**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

**Controller Regulators**
Electric Service Supplies Co.

**Controlling Systems**
General Electric Co.
Westinghouse Elec. & M. Co.

**Converters, Rotary**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

**Conveying and Hoisting Machinery**
Columbia M. W. & M. I. Co.

**Copper Wire**
Anaconda Copper Mining Co.
Rome Wire Co.

**Cord, Bell, Trolley, Register, etc.**
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Roebling's Sons Co., John A.
Samson Cordage Works
Silver Lake Co.

**Cord Connectors and Couplers**
Electric Service Supplies Co.
Samson Cordage Work
Wood Co., Chas. N.

**Couplers, Car**
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Tr. Br. Co.

**Cranes**
Allis-Chalmers Mfg. Co.
Universal Crane Co.

**Cranes, Gas or Electric**
Universal Crane Co.

**Cranes, Locomotive, Motor Truck & Portable**
Universal Crane Co.

**Cross Arms (See Brackets)**

**Crossings**
Ramapo Ajax Corp.

**Crossing Foundations**
International Steel Tie Co.

**Crossing Frogs and Switches**
Ramapo Ajax Corp.
Wm. Wharton Jr. & Co., Inc.

**Crossings, Manganese**
Bethlehem Steel Co.
Ramapo Ajax Corp.

**Crossing Signals (See Signal Systems, Highway Crossing)**

**Crossings, Track, (See Track, Special Work)**

**Crossings, Trolley**
Ohio Brass Co.

**Crushers, Rock**
Allis-Chalmers Mfg. Co.

**Curtains and Curtain Fixtures**
Brill Co., The J. G.
Electric Service Supplies Co.
Morton Mfg. Co.

**Cutouts**
Johns Pratt Co.

**Dealers' Machinery**
Electric Equipment Co.
Hyman Machaess Co
Transit Equipment Co.

**Derailing Switches, Tee Rail**
Ramapo Ajax Corp.

**Destination Signs**
Electric Service Supplies Co.

**Detective Service**
Wish Service, P. Edward

**Door Operating Devices**
Consolidated Car Heating Co.
National Pneu. Co., Inc.

**Doors and Door Fixtures**
Brill Co., The J. G.
General Electric Co.
Hale-Kilburn Co.
St. Louis Car Co.

**Doors, Folding Vestibule**
National Pneumatic Co., Inc.

**Draft Rigging, (See Couplers)**

**Drills, Track**
American Steel & Wire Co
Electric Service Supplies Co.
Ingersoll-Rand Co.
Ohio Brass Co.

**Dryers, Sand**
Electric Service Supplies Co.

**Ears**
Ohio Brass Co.

**Economizers**
Power Specialty Co.

**Electric Grinders**
Railway Track-work Co.

**Electrodes, Carbon**
Railway Track-work Co.
Rail Welding & Bonding Co.

**Electrodes, Steel**
Railway Track-work Co.
Rail Welding & Bonding Co.

**Electrical Wires and Cables**
American Elec. Works
Roeblings Sons Co., J. A.
Rome Wire Co.

**Engineers, Consulting, Contracting and Operating**
Allison & Co., J. E.
Archbold Brady Co.
Beeler, John A.
Bibbins J. Rowland
Buchanan & Layng
Bureau of Commercial Economics, Inc.
Day & Zimmerman, Inc.
Drum & Co., A. L.
Feustel, Robert M.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelly Cooke & Co
Ong, Jee R.
Parsons, Klapp, Brinkerhoff & Douglas
Railway Audit & Inspection Co.
Richey, Albert S.
Dwight P. Robinson & Co.
Sanderson & Porter
Shaw, Henry M.
Stevens & Wood, Inc.
Stone & Webster

**Engineers Inspecting & Chemists**
Pittsburgh Testing Laboratory

**Engines, Gas, Oil and Steam**
Allis-Chalmers Mfg. Co.
Ingersoll Rand Co.
Westinghouse Elec. & M. Co.

**Expansion Joints, Track**
Wharton, Jr., & Co., Inc., Wm.

**Exterior Side Panels**
Haskelite Mfg. Co.

**Fare Boxes**
Cleveland Fare Box Co
Economy Elec. Devices Co.
Galef, J. L.
Nat'l Ry. Appliance Co.

**Fences, Woven Wire and Fence Posts**
Amer. Steel & Wire Co.

**Fenders and Wheel Guards**
Brill Co., The J. G.
Consolidated Car Fender Co
Electric Service Sup. Co.
Mar Brass Works

**Fibre and Fibre Tubing**
Westinghouse Elec. & M. Co

**Field Coils (See Coils)**

**Flexlinum Insulation**
Nat'l Ry. Appliance Co.

**Floodlights**
Electric Service Sup. Co.

**Forgings**
Carnegie Steel Co.
Columbia M. W. & M. I. Co.

**Frogs & Crossings, Tee Rail**
Bethlehem Steel Co
Ramapo Ajax Corp.

**Frogs, Track, (See Track Work)**

**Frogs, Trolley**
Ohio Brass Co

**Funnel Castings**
Wm. Wharton Jr. & Co.

**Furnaces, Electric**
American Bridge Co.

**Fuses Cartridge, Non Refillable & High Voltage**
Johns Pratt Co.

**Fuses Cartridge, Refillable**
Johns Pratt Co.

**Fuses and Fuse Boxes**
Consolidated Car Heating Co.
General Electric Co.
Westinghouse Elec. & M. Co

**Fuses, Refillable**
General Electric Co.

**Galvanizers, Hot Dip**
Jos. P. Cattie & Bros

**Gaskets**
Westinghouse Tr. Br. Co

**Gas-Electric Cars**
General Electric Co.

**Gasoline Torches**
Economy Elec. Devices Co.




*Ingersoll-Rand Paving Breakers tearing up track foundation operated from I-R Electric Driven Portable Air Compressor.*

# A dozen times faster

## The Compressed Air Way Saves Time and Money

Ingersoll-Rand Portable Air Compressors and Tools finish up many jobs in a fraction of the time required by hand methods.

Pneumatic "Paving Breakers" save more than 50% in time and labor over hand methods, when breaking out pavement shoulders, heavy foundation, etc.

Pneumatic Tie Tampers enable four men to tamp more track and do it better than twelve to sixteen men using hand methods.

Other air tools are also used to save money on various jobs, making the portable compressor outfit a most important factor in reducing track costs. Ask for complete information on the savings made with portable air power units.

**Ingersoll-Rand Company**
**11 Broadway, New York**
*Offices in the Principal Cities the World Over*
**For Canada, refer Canadian Ingersoll-Rand Co., Limited**
**260 St. James Street, Montreal, Quebec.**

# Ingersoll-Rand

**Gas Producers**
Westinghouse Elec. & M. Co.

**Gates, Car**
Brill Co., The J. G.

**Gear Blanks**
Bethlehem Steel Co.
Carnegie Steel Co.

**Gear Cases**
Chillingworth Mfg. Co.
Electric Service Supplies Co.
Westinghouse Elec. & M. Co

**Gears and Pinions**
Bemis Car Truck Co.
Bethlehem Steel Co.
Electric Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

**Generating Sets, Gas-Electric**
General Electric Co.

**Generators**
Allis-Chalmers Mfg. Co.
English Electric Co.
General Electric Co.
Westinghouse Elec. & M. Co

**Girder Rails**
Bethlehem Steel Co.
Lorain Steel Co., The

**Gongs (See Bells and Gongs)**

**Greases (See Lubricants)**

**Grinders and Grinding Supplies**
Railway Track-work Co

**Grinders, Portable**
Railway Track-work Co

**Grinders, Portable Electric**
Railway Track-work Co

**Grinding Blocks and Wheels**
Railway Track-work Co

**Guard Rail Clamps**
Ramapo Ajax Corp.

**Guard Rails, Tee Rail & Manganese**
Ramapo Ajax Corp.

**Guards, Cattle**
American Bridge Co.

**Guards, Trolley**
Electric Service Sup. Co
Ohio Brass Co.

**Hammers, Pneumatic**
Ingersoll-Rand Co.

**Harps, Trolley**
Anderson M. Co., A. & J. M
Electric Service Sup. Co
More-Jones Brass & Metal Co.
Nuttall Co., R. D.

**Headlights**
Electric Service Sup. Co
General Electric Co
Ohio Brass Co

**Headlining**
Haskelite Mfg. Co.
Panelyte Co.

**Heaters, Car (Electric)**
Consolidated Car Heating Co.
Gold Car Heating & Lighting Co.
Nat'l Ry. Appliance Co
Smith Heater Co., Peter Wm.

**Heaters, Car, Hot Air and Water**
Electric Service Sup. Co
Smith Heater Co., Peter Wm.

**Heaters for Special Purposes**
Power Specialty Co

**Helmets, Welding**
Railway Track-work Co.
Rail Welding & Bonding Co

**Hoists, Portable**
Ingersoll-Rand Co.

**Hose, Bridge**
Ohio Brass Co.

**Hydraulic Machinery**
Allis-Chalmers Mfg. Co

**Indicating, Signals**
Nichols-Lintern Co.

**Inspecting Engineers & Chemists**
Pittsburgh Testing Laboratory

**Instruments, Measuring, Testing and Recording**
Electric Service Sup. Co.
General Electric Co
Westinghouse Elec. & M. Co.

**Insulating Cloth, Paper and Tape**
Anchor Webbing Co.
General Electric Co.
Hope Webbing Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Standard Underground Cable Co.
Westinghouse E. & M. Co.

**Insulating Machinery**
Amer. Ins. Machinery Co.

**Insulating Silk**
Irvington Varnish & Ins. Co.

**Insulating Varnishes**
Irvington Varnish & Ins. Co.

**Insulation (See also Paints)**
Anderson M. Co., A. & J. M.
Electric Ry. Equipment Co.
Electric Service Sup. Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Mica Insulator Co.
Okonite Co.
Westinghouse Elec. & M. Co.

**Insulation Cloth Paper & Tape**
Mitchell-Rand Co.
Mica Insulator Co.

**Insulation, Slot**
Irvington Varnish & Ins. Co.

**Insulator Pins**
Electric Service Sup. Co.
Hubbard & Co.

**Insulators (See also Line Material)**
Anderson M. Co., A. & J. M
Electric Ry. Equipment Co
Electric Service Sup. Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co

**Insulators, High Voltage**
Lapp Insulator Co., Inc.

**Jacks (See also Hoists and Lifts)**
Buda Company
Electric Service Sup. Co.
National Ry. Appliance Co.

**Journal Boxes**
Bemis Car Truck Co.
Brill Co., The J. G.

**Junction Boxes**
Standard Underground Cable Co.

**Lamp Guards and Fixtures**
Anderson M. Co., A. & J. M
Electric Service Sup. Co
General Electric Co
Westinghouse E. & M. Co

**Lamps, Arc and Incandescent (See also Headlights)**
Anderson M. Co., A. & J. M
General Electric Co.
Westinghouse E. & M. Co.

**Lamps, Signal and Marker**
Nichols-Lintern Co.

**Lanterns, Classification**
Nichols-Lintern Co.

**Lightning Arrestors**
Shaw, Henry M.

**Lightning Protection**
Anderson M. Co., A. & J. M
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co

**Line Material (See also Brackets, Insulators, Wires, Etc.)**
Anderson M. Co., A. & J. M
Archbold-Brady Co.
Columbia M. W. & M. I. Co.
Electric Ry. Equipment Co
Electric Service Sup. Co.
English Electric Co.
General Electric Co.
Hubbard & Co.
More-Jones Brass & Metal Co.
Westinghouse Elec. & M. Co

**Locking Spring Boxes**
Wm. Wharton Jr. & Co., Inc

**Locomotives, Electric**
Baldwin Locomotive Wks.
General Electric Co
Westinghouse Elec. & M. Co

**Locomotives, Oil Engine, Electric Driven**
Ingersoll-Rand Co.

**Lubricating Engineers**
Galena-Signal Oil Co.
Texas Company
Universal Lubricating Co.

**Lubricants, Oil and Grease**
Galena Signal Oil Co.
Texas Company
Universal Lubricating Co

**Lumber (See Poles, Ties, etc.)**

**Machine Tools**
Columbia M. W. & M. I. Co.

**Manganese Parts**
Bemis Car Truck Co.

**Manganese Steel Castings**
Wm. Wharton Jr. & Co., Inc

**Manganese Steel Guard Rails**
Ramapo Ajax Corp.

**Manganese Steel, Special Track Work**
Bethlehem Steel Co.
Wm. Wharton Jr. & Co., Inc.

**Manganese Steel Switches, Frogs and Crossings**
Bethlehem Steel Co.
Ramapo Ajax Corp

**Meters, Car Watt-Hour**
Economy Electric Devices Co.

**Mica**
Mica Insulator Co.

**Motor and Generator Sets**
General Electric Co.

**Motor Buses (See Buses, Motor)**

**Motormen's Seats**
Brill Co., The J. G.
Electric Service Sup. Co.
St. Louis Car Co.
Wood Co., Chas. N.

**Motors, Electric**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

**Nuts and Bolts**
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Bethlehem Steel Co.
Columbia M. W. & M. I. Co.
Hubbard & Co.

**Oil Heaters**
Power Specialty Co.

**Oils (See Lubricants)**

**Packing**
Electric Service Sup. Co.
Westinghouse Tr. Br. Co.

**Paints & Varnish Preservatives**
Baldwin Locomotive Wks.

**Paints and Varnishes for Woodwork**
National Ry Appliance Co

**Pavement Breakers**
Ingersoll Rand Co

**Paving Material**
Amer Br. Shoe & Fdry. Co

**Pickups, Trolley Wire**
Electric Service Sup. Co.
Ohio Brass Co

**Pinion Pullers**
Columbia M. W. & M. I. Co
Electric Service Sup Co
General Electric Co.
Wood Co., Chas. N.

**Pinions (See Gears)**

**Pins, Case Hardened, Wood and Iron**
Bemis Car Truck Co.
Electric Service Sup. Co
Ohio Brass Co.
Westinghouse Tr. Br. Co.

**Pipe**
National Tube Co

**Planers (See Machine Tools)**

**Plates for Tee Rail Switches**
Ramapo Ajax Corp.

**Pliers, Rubber Insulated**
Electric Service Sup Co.

**Pneumatic Tools and Accessories**
Ingersoll-Rand Co.

**Pole Line Hardware**
Bethlehem Steel Co.
Ohio Brass Co.

**Pole Reinforcing**
Drew Elec. & Mfg. Co
Hubbard & Co.

**Poles and Ties, Treated**
Bell Lumber Co.
International Creosoting & Construction Co
National Pole Co.
Weyerhaeuser Sales Co

**Poles, Metal Street**
Bates Expanded Steel Truss Co.
Electric Ry. Equip. Co.
Hubbard & Co.

**Poles, Ties, Posts, Piling and Lumber**
Bell Lumber Co
International Creosoting & Construction Co
National Pole Co.
Weyerhaeuser Sales Co

**Poles, Trolley**
Anderson M. Co., A. & J. M
Columbia M. W. & M. I. Co
National Tube Co.
Nuttall Co., R. D.

**Poles, Tubular Steel**
Elec. Ry. Equip. Co.
Electric Service Sup. Co
National Tube Co.

**Porcelain, Special High Voltage**
Lapp Insulator Co.

**Portable Grinders**
Buda Company

**Pothends**
Okonite Co.

**Power Saving Devices**
Nat'l Ry. Appliance Co.

**Pressure Regulators**
General Electric Co.
Westinghouse Elec. & M. Co.

**Pumps**
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.

**Pumps, Vacuum**
Ingersoll-Rand Co.

**Punches, Ticket**
International Register Co., The
Wood Co., Chas. N.

**Rail Braces and Fastenings**
Ramapo Ajax Corp.

**Rail Filler**
Philip Carey Co.

**Rail Joints**
Carnegie Steel Co.
Rail Joint Co.

**Rail Grinders (See Grinders)**

**Rail Welding**
Rail Welding & Bonding Co.

**Rails, Relaying**
L. B. Foster Co.
Hyman-Michaels Co.

**Rails, Steel**
Carnegie Steel Co.
L. B. Foster Co.

**Railway Safety Switches**
Consolidated Car Heating Co.
Westinghouse Elec. & M. Co.

**Railway Welding (See Welding Processes)**

**Rattan**
Brill Co., The J. G.
Electric Service Sup. Co.
Hale-Kilburn Co.
Heywood-Wakefield Co.
St. Louis Car Co.

**Registers and Fittings**
Brill Co., The J. G.
Electric Service Sup. Co.
International Reg. Co., The
Rooke Automatic Reg. Co.

**Reinforcement, Concrete**
Amer. Steel & Wire Co.
Bethlehem Steel Co.
Carnegie Steel Co.

**Repair Shop Appliances (See also Coil Banding and Winding Machines)**
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.

**Repair Work (See also Coils)**
Columbia M. W. & M. I. Co
General Electric Co.
Westinghouse Elec. & M. Co.

**Replacers, Car**
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.

**Resistance, Grid**
Columbia M. W. & M. I. Co

**Resistance, Wire and Tube**
General Electric Co.
Westinghouse Elec. & M. Co.

**Resistances**
Consolidated Car Heating Co.

**Retrievers, Trolley (See Catchers and Retrievers, Trolley)**

**Rheostats**
General Electric Co.
Westinghouse Elec. & M. Co.

**Roofs**
Haskelite Mfg. Co.

**Sanders, Track**
Brill Co., The J. G.
Columbia M. W. & M. I. Co
Electric Service Sup. Co.
Nichols-Lintern Co.
Ohio Brass Co.

**Sash Fixtures, Car**
Brill Co., The J. G.

**Sash, Metal, Car Window**
Hale-Kilburn Co.

**Scrapers, Track (See Cleaners and Scrapers, Track)**

**Screw Drivers, Rubber Insulated**
Electric Service Sup. Co.

**Seating Materials**
Brill Co., The J. G.

**Seats, Bus**
Hale-Kilburn Co.
Heywood-Wakefield Co.
St. Louis Car Co.

**Seats, Car (See also Rattan)**
Brill Co., The J. G.
Hale-Kilburn Co.
Heywood Wakefield Corp
St. Louis Car Co.

**Second-Hand Equipment**
Electric Equipment Co.
Hyman-Michaels Co.
Transit Equipment Co
Zelnicker Supply Co., W. A.

**Shades, Vestibule**
Brill Co., The J. G.

**Shovels**
Hubbard & Co.

**Shovels, Power**
Allis-Chalmers Mfg. Co.
Brill Co., The J. G.

**Signals, Car Starting**
Consolidated Car Heating Co.
Electric Service Sup. Co.
Nat'l Pneumatic Co., Inc.

**Signals, Indicating**
Nichols-Lintern Co.

**Signal Systems, Block**
Electric Service Sup. Co.
Nachod Signal Co., Inc.
Union Switch & Signal Co.
U. S. Electric Signal Co
Wood Co., Chas. N.

**Signal Systems, Highway Crossing**
Nachod Signal Co., Inc.
U. S. Electric Signal Co.

**Slack Adjusters (See Brake Adjusters)**

**Slag**
Carnegie Steel Co

**Sleet Wheels and Cutters**
Anderson M. Co. A. & J. M.
Electric Ry. Equip. Co.
Electric Service Sup. Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.

**Smokestacks, Car**
Nichols-Lintern Co.

**Snow-Plows, Sweepers and Brooms**
Brill Co., The J. G.
Consolidated Car Fender Co.

**Snow Sweeper, Rattan**
Heywood-Wakefield Co.

**Soldering and Brazing (See Welding Processes and Apparatus)**

**Spikes**
Amer. Steel & Wire Co.

**Special Adhesive Papers**
Irvington Varnish & Ins. Co.

**Special Trackwork**
Bethlehem Steel Co.
Lorain Steel Co., The

**Splicing Compounds**
Westinghouse Elec. & M. Co

**Splicing Sleeves (See Clamps and Connectors)**

**Springs, Car and Truck**
Bemis Car Truck Co.
Brill Co., The J. G.
Ft. Pitt Spring & Mfg. Co.
St. Louis Car Co.
Taylor Electric Truck Co.

**Sprinklers, Track and Road**
Brill Co., The J. G.

**Steel Castings**
Wm. Wharton Jr. & Co., Inc

**Steel and Steel Products**
Morton Mfg. Co.

**Steps, Car**
Morton Mfg. Co.

**Stokers, Mechanical**
Babcock & Wilcox Co.
Westinghouse Elec. & M. Co

**Storage Batteries (See Batteries, Storage)**

**Strain Insulators**
Ohio Brass Co.

**Strand**
Roebling's Sons Co., J. A.

**Subway Boxes**
Johns-Pratt Co

**Superheaters**
Babcock & Wilcox Co.
Power Specialty Co

**Sweepers, Snow (See Snow Plows, Sweepers and Brooms)**

**Switch Stands**
Ramapo Ajax Corp.

**Switches, Safety**
Johns-Pratt Co.

**Switches and Switchboards**
Allis-Chalmers Mfg. Co
Anderson M. Co., A. & J. M
Electric Service Sup. Co.
General Electric Co.
Westinghouse Elec. & M. Co

**Switches, Selector**
Nichols-Lintern Co

**Switches, Tee Rail**
Ramapo Ajax Corp

**Switches, Track (See Track, Special Work)**

**Tampers, Tie**
Ingersoll Rand Co.
Railway Track-work Co.

**Tapes and Cloths (See Insulating Cloth, Paper and Tape)**

**Tee Rail, Special Track Work**
Bethlehem Steel Co
Ramapo Ajax Corp.

**Telephones and Parts**
Electric Service Sup. Co

**Terminals, Cable**
Standard Underground Cable Co.

**Testing Devices, Meter**
Johns Pratt Co.

**Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)**



Madison Ave., Albany, N. Y. Carey Elastite Rail Filler Used.



Installing Carey Elastite Rail Filler. A tap of the mallet sets it securely in place.



Carey Elastite Rail Filler is made to exactly fit any rail section.

# Stop paving failure along your track!

When water gets between the rail and the paving, and freezes, something must yield. The paving blocks must buckle on each other, or the concrete must fail.

But if you lay a snug-fitting, water-tight, resilient asphalt cushion of Carey Elastite Rail Filler in the rail, bonding with the concrete or the bituminous filler, you eliminate the fundamental causes of pavement failure—rail vibration, traffic—impact, expansion and the action of water and frost, and you provide a cushion that greatly reduces traffic-noise.

THE PHILIP CAREY COMPANY
Lockland, Cincinnati, Ohio

## Elastite Rail Filler Is Easy to Install

**a tap of a mallet holds it in the web of the rail.**

Carey Elastite Rail Filler is a composition of specially-tempered asphalt and fibre which is used as a resilient cushion between the rail and the pavement, absorbing traffic-impact, rail vibration and traffic-noise. It is preformed to fit any rail-section and is readily shaped on the job to fit any track-curve. It is unaffected by moisture or temperature changes and is enduring under all service conditions.

Carey Elastite

NAME REG. U.S Patent Office

# RAIL FILLER

**Thermostats**
Consolidated Car Heating Co.
Gold Car Heating & Lighting Co.
Railway Utility Co.
Smith Heater Co., Peter

**Ticket Choppers and Destroyers**
Electric Service Sup. Co.

**Ties, Mechanical**
Dayton Mechanical Tie Co.

**Ties and Tie Rods, Steel**
American Bridge Co.
Carnegie Steel Co.
International Steel Tie Co.

**Ties, Wood Cross (See Pole, Ties, Posts, etc.)**

**Tokens**
Scovill Mfg. Co.

**Tongue Switches**
Wm. Wharton Jr. & Co.

**Tool Steel**
Bethlehem Steel Co.
Carnegie Steel Co.

**Tools, Track and Misc.**
Amer. Steel & Wire Co.
Electric Service Sup. Co.
Hubbard & Co.
Railway Track-work Co.

**Towers and Transmission Structures**
Archbold-Brady Co.
Bates Expanded Steel Truss Co.
Westinghouse Elec. & M. Co.

**Track Expansion Joints**
Wm. Wharton Jr. & Co.

**Track Grinders**
Railway Track-Work Co.

**Trackless Trolleys**
Pierce-Arrow Motor Car Co.
St. Louis Car Co.

**Track, Special Work**
Bethlehem Steel Co.
Buda Company
N. Y. Switch & Crossing Co.
Ramapo Ajax Corp.
Wharton, Jr., & Co., Inc., Wm.

**Transfer Tables**
American Bridge Co.

**Transformers**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

**Transmission Towers & Structures**
Amer. Bridge Co.

**Treads, Safety, Stair, Car Step**
Morton Mfg. Co.

**Trolley Bases**
Anderson M. Co., A. & J. M
Electric Service Sup. Co.
General Electric Co.
More-Jones Brass & Metal Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Ohio Brass Co.

**Trolley Bases, Retrieving**
Anderson M. Co., A. & J. M
Electric Service Sup. Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Ohio Brass Co.

**Trolley Buses**
Brill Co., The J. G.
General Electric Co.
Westinghouse Elec. & M. Co.

**Trolley Materials**
Electric Service Sup. Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.

**Trolley Shoes**
Economy Elec. Devices Co.
Miller Trolley Shoe Co.

**Trolley Wheels (See Wheels, Trolley)**

**Trolley Wheels, Bushings**
More-Jones Brass & Metal Co.

**Trolley Wheels & Harps**
More-Jones Brass & Metal Co.

**Trolley Wire**
American Elec'l Works
Amer. Steel & Wire Co.
Anaconda Copper Mining Co
Roeblings Sons Co., J. A.
Rome Wire Co.

**Trucks, Car**
Baldwin Locomotive Wks.
Brill Co., The J. G.
Bemis Car Truck Co.
St. Louis Car Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.

**Tubing, Steel**
National Tube Co.

**Tubing, Yellow & Black Flexible Varnished**
Irvington Varnish & Ins. Co.

**Turbines, Steam**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

**Turbine Water**
Allis-Chalmers Mfg. Co.

**Turnstiles**
Electric Service Supplies Co.
Perey Mfg. Co., Inc.

**Vacuum Impregnation**
Allis-Chalmers Mfg. Co.

**Valves**
Ohio Brass Co.
Westinghouse Tr. Br. Co.

**Varnished Papers**
Irvington Varnish & Ins. Co.

**Varnish Silks**
Irvington Varnish & Ins. Co.

**Varnishes (See Paints, etc.)**

**Ventilators, Car**
Brill Co., The J. G.
National Ry. Appliance Co.
Nichols-Lintern Co.
Railway Utility Co.
St. Louis Car Co.

**Vestibule Linings**
Haskelite Mfg. Co.

**Welded Rail Joints**
Alumino-Thermic Corp.
Electric Ry. Improvement Co.
Ohio Brass Co.
Railway Track-work Co.
Rail Welding & Bonding Co.

**Welders, Portable Electric**
Electric Ry. Imp. Co.
Ohio Brass Co.
Railway Track-work Co
Rail Welding & Bonding Co.

**Welding Processes and Apparatus**
Alumino-Thermic Corp.
Elec. Ry. Improvement Co.
General Electric Co.
National Ry. Appliance Co.
Ohio Brass Co.
Railway Track-work Co.
Rail Welding & Bonding Co.
Westinghouse Elec. & M. Co

**Welding Steel**
Electric Ry. Improvement Co.
Railway Track-work Co.
Rail Welding & Bonding Co.

**Wheel Guards (See Fenders and Wheel Guards)**

**Wheel Grinders**
Wheel Truing Brake Shoe Co.

**Wheels, Car Steel & Steel Tire**
Carnegie Steel Co.

**Wheel Presses (See Machine Tools)**

**Wheels, Trolley**
Anderson Mfg. Co., A. & J. M.
Electric Ry. Equip. Co.
Elec. Service Supplies Co.
General Electric Co.
Gilbert & Sons, B. F. A.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Star Brass Works

**Whistles, Air**
General Electric Co.
Ohio Brass Co.
Westinghouse Tr. Br. Co.

**Wire Rope**
Amer. Steel & Wire Co.
Roeblings Sons Co., J. A.

**Wires and Cables**
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
General Electric Co.
Okonite Co.
Roeblings Sons Co., J. A. Co.
Rome Wire Co.
Standard Underground Cable Co
Westinghouse Elec. & M. Co

**Wood Preservatives**
Baker Wood Preserving Co

**Woodworking Machinery**
Allis-Chalmers Mfg. Co.

# ALPHABETICAL INDEX TO ADVERTISEMENTS


A

| | Page |
|---|---|
| Ajax Metal Co. | 52 |
| Allis-Chalmers Mfg. Co. | 42 |
| Allison Co., J. E. | 22 |
| Alumino-Thermic Corp. | 48 |
| Amer. Brake Shoe & Fdy. Co. | 53 |
| American Car Co. | 61 |
| American Electrical Works | 46 |
| American Insulating Machinery Co. | 46 |
| American Steel & Wire Co. | 47 |
| American Technical Society | 44 |
| Anaconda Copper Mining Co. | 46 |
| Anchor Webbing Co. | 48 |
| Anderson Mfg. Co., A. & J. M. | 41 |
| Archbold-Brady Co. | 23 |
| Auto Body Co. | 24 |

B

| | |
|---|---|
| Babcock & Wilcox Co. | 48 |
| Baldwin Locomotive Works | 43 |
| Bates Expanded Steel Truss Co. | 18 |
| Beeler, John A. | 22 |
| Bell Lumber Co. | 52 |
| Bemis Car Truck Co. | 34 |
| Bethlehem Steel Co. | 35 |
| Bibbins, J. Rowland | 22 |
| Brill Co., The J. G. | 61 |
| Buchanan & Layng Corp. | 23 |
| Buda Co. | 47 |
| Bureau of Comm. Economics, Inc. | 23 |

C

| | |
|---|---|
| Cameron Electrical Mfg. Co. | 48 |
| Carey, Philip Co. | 59 |
| Carnegie Steel Co. | 32, 47 |
| Cattie & Bros., Joseph P. | 49 |
| Chillingworth Mfg. Co. | 54 |
| Cleveland Fare Box Co. | 50 |
| Collier, Inc., Barron G. | 26 |
| Consolidated Car Fender Co. | 52 |
| Consolidated Car Heating Co. | 36 |

D

| | |
|---|---|
| Dayton Mechanical Tie Co. | 43 |
| Day & Zimmermann, Inc. | 25 |
| Differential Steel Car Co., The | 53 |
| Dixon Crucible Co., Joseph | 52 |
| Drum & Co., A. L. | 22 |

E

| | |
|---|---|
| Earl, C. I. | 53 |
| Economy Electric Devices Co. | 17 |
| Electric Equipment Co. | 55 |
| Electric Ry. Equipment Co. | 46 |
| Elec. Ry. Improvement Co. | 49 |
| Electric Service Supplies Co. | 9 |
| English Electric Co. | A |

F

| | |
|---|---|
| Ford, Bacon & Davis | 22 |
| "For Sale" Ads. | 55 |
| Fort Pitt Spring & Mfg. Co. | 49 |
| Foster Co., Inc., L. B. | 39 |

G

| | |
|---|---|
| Galef, J. L. | 50 |
| Galena-Signal Oil Co. | 19 |
| General Electric Co. | 20, Back Cover |
| Gold Car Heating & Ltg. Co. | 51 |

H

| | |
|---|---|
| Hale-Kilburn Co. | 51 |
| Haskelite Mfg. Co. | 51 |
| "Help Wanted" Ads. | 55 |
| Hemphill & Wells | 22 |
| Heywood-Wakefield Co. | 51 |
| Holst, Englehart W. | 22 |
| Hope-Webbing Co. | 48 |
| Hubbard & Co. | 46 |
| Hyman-Michaels Co. | 55 |

I

| | |
|---|---|
| Ingersoll-Rand Co. | 57 |
| International Creo. & Const. Co. | 16 |
| International Motor Co. | 14-15 |
| International Register Co., The | 50 |
| International Steel Tie Co., The | 7 |
| Irvington Varnish & Insulator Co. | 48 |

J

| | |
|---|---|
| Jackson, Walter | 22 |
| Jeandron, W. J. | 53 |
| Johnson & Co., Inc., J. R. | 54 |
| Johnson Fare Box Co. | 50 |
| Johns-Pratt Co. | 47 |

K

| | |
|---|---|
| Kelly-Cooke Co. | 22 |
| Kuhlman Car Co. | 61 |

L

| | |
|---|---|
| Laclede Steel Co. | 54 |
| Lapp Insulator Co., Inc. | 46 |
| Le Carbone Co. | 53 |
| Lorain Steel Co. | 47 |

M

| | |
|---|---|
| McGuire-Cummings Mfg. Co. | 54 |
| Mica Insulator Co. | 49 |
| Miller Trolley Shoe Co. | 31 |
| More-Jones Brass & Metal Co. | 54 |
| Morton Mfg. Co. | 52 |

N

| | |
|---|---|
| Nachod Signal Co. | 46 |
| National Brake Co. | 21 |
| National Pneumatic Co., Inc. | 11 |
| National Pole Co. | 12 |
| National Ry. Appliance Co. | 49 |
| National Tube Co. | 33 |
| New York Transportation Co. | 13 |
| N. Y. Switch & Crossing Co. | 47 |
| Nichols-Lintern Co. | 50 |
| Nuttall Co., R. D. | 44 |

O

| | |
|---|---|
| Ohio Brass Co. | 5 |
| Okonite Co., The | 48 |
| Ong, Joe B. | 22 |

P

| | |
|---|---|
| Panelyte Co. | 51 |
| Perey Mfg. Co., Inc. | 50 |
| Pittsburgh Testing Laboratory | 49 |
| Positions Wanted and Vacant | 55 |
| Power Specialty Co. | 48 |

R

| | |
|---|---|
| Rail Joint Co. | 47 |
| Railway Audit & Inspection Co. | 23 |
| Railway Track-work Co. | 6 |
| Railway Utility Co. | 51 |
| Rail Welding & Bonding Co. | 30 |
| Ramapo Ajax Corp. | 46 |
| Richey, Albert S. | 22 |
| Robinson Co., Dwight P. | 22 |
| Roebling's Sons Co., John A. | 46 |
| Rome Wire Co. | 42 |
| Rooke Automatic Register Co. | 50 |

S

| | |
|---|---|
| St. Louis Car Co. | 37 |
| Samson Cordage Works | 51 |
| Sanderson & Porter | 22 |
| Scovill Mfg. Co. | 40 |
| Searchlight Section | 55 |
| Silver Lake Co. | 54 |
| Smith Heater Co., Peter | 51 |
| Shaw, Henry M. | 46 |
| Standard Underground Cable Co. | 45 |
| Star Brass Works | 54 |
| Stevens & Wood, Inc. | 22 |
| Stone & Webster | 22 |
| Stucki Co., A. | 62 |
| Superior Motor Coach Body Co. | 25 |

T

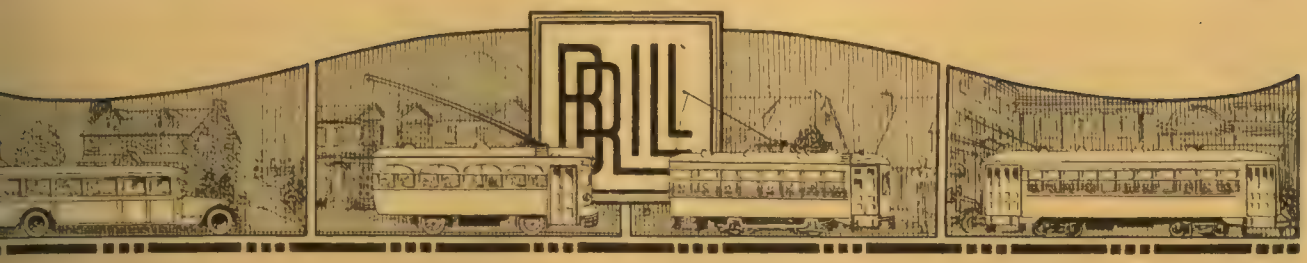
| | |
|---|---|
| Taylor Electric Truck Co. | 45 |
| Texas Co. | 28 |
| Thomas Car Works, Perley A. | 45 |
| Tool Steel Gear & Pinion Co. | 51 |
| Transit Equipment Co. | 56 |
| Trumbull Steel Co. | 27 |

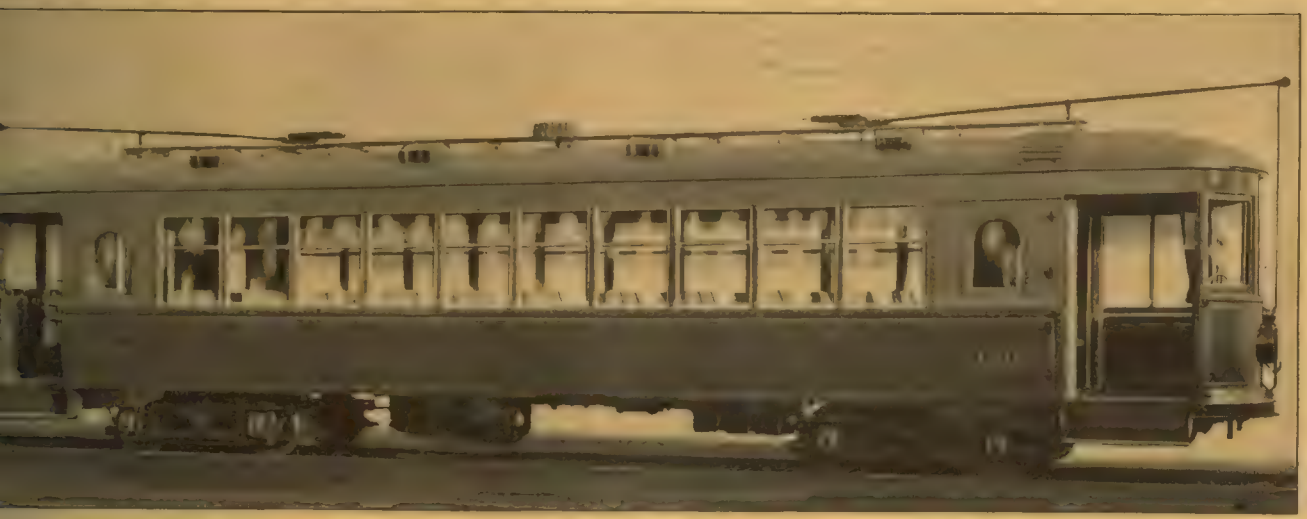
U

| | |
|---|---|
| Union Switch & Signal Co. | 8 |
| U. S. Electric Signal Co. | 46 |
| Universal Crane Co. | 31 |
| Universal Lubricating Co. | 49 |

W

| | |
|---|---|
| "Want" Ads. | 55 |
| Wason Mfg. Co. | 61 |
| Westinghouse Elec. & Mfg. Co. | 2-4 |
| Westinghouse Traction Brake Co. | 10 |
| Weyerhaeuser Sales Co. | 29 |
| Wharton, Jr. & Co., Inc., Wm. | 41 |
| Wheel Truing Brake Shoe Co. | 54 |
| Wheeling Corrugating Co. | 42 |
| White Eng. Corp. The J. G. | 22 |
| Wish Service, The P. Edw. | 23 |
| Wood Co., Chas. N. | 46 |



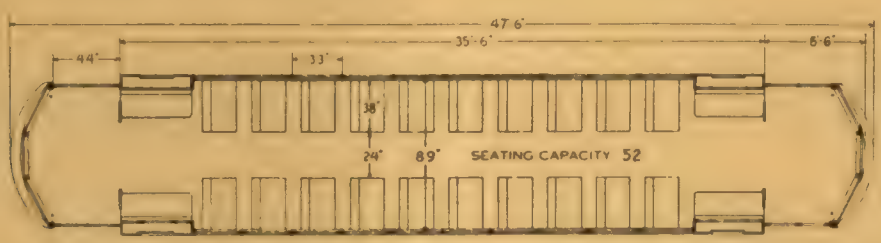



# York Railway's New Cars

## are mounted on Brill 77-E Low-level Trucks

This type suburban car recently shipped to York, Pa. was not only designed to economize through comparatively light weight, but particular consideration was also given to attractiveness and riding comfort, features which tend to increase passenger revenue.

The comfortable riding Brill 77-E Low-level Trucks, on which these cars are mounted, are equipped with Brill Twin Swing Links.




**Equipped with four 40 Hp. Motors.**
**Total weight, 38,020 lb.**

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

AMERICAN CAR CO. ST. LOUIS MO. — G.C. KUHLMAN CAR CO. CLEVELAND, OHIO. — WASON MANF'G CO. SPRINGFIELD, MASS.

# G-E Modern Railway Motors



GE-265
35 h.p.

GE-264
25 h.p.



GE-275
60 h.p.

These six standard G-E Motors will meet the motive power requirements of any city, suburban or interurban service. On an average they cost, for maintenance and inspection, only $35 per motor per year. Consider the economy accruing from replacement of your old motors by one of these modern types.



GE-263
65 h.p.



GE-240
105 h.p.

GE-25
140 h.p

25-170

# GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY SCHENECTADY, N. Y., SALES OFFICES IN ALL LARGE CITIES

w-Hill Company, Inc. December 13, 1924 Twenty Cents Per Copy

# ELECTRIC RAILWAY JOURNAL

HOUSTON PUBLIC LIBRARY



Wrought solid steel wheels and heat treated axles, manufactured by the Standard Steel Works Company, will be used exclusively on 150 new cars now in course of construction for the Interborough Subway of New York.

STANDARD STEEL WORKS COMPANY

PHILADELPHIA, PA.

BRANCH OFFICES:

CHICAGO, ST. LOUIS, NEW YORK, HOUSTON, TEXAS, PORTLAND, ORE., RICHMOND, VA., SAN FRANCISCO, BOSTON, ST. PAUL, MINN., PITTSBURGH, PA., LOS ANGELES, CAL., MEXICO CITY, MEX.

WORKS: BURNHAM, PA.

# Additional Electrification



***Multiple-Unit Train of the Long Island Railroad***

Each car equipped with two No. 308 Motors, 215 hp. each, and electro-pneumatic control.

THE Long Island Railroad is extending its electrification approximately 20 miles to Babylon, in order to more efficiently handle the tremendous traffic in and out of New York City, which traffic has increased over 450% since 1905.

The order for the complete substation equipment for this extension, consisting of 10 rotaries with their transformers and switching equipment, has been placed with the Westinghouse Electric & Manufacturing Company.

In addition, 40 motor-car equipments have been purchased, making a total of 638 Westinghouse Multiple-Unit Equipments available to assist the Long Island Railroad to maintain 100% service.

***Westinghouse Equipment Leads the Way***

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in all Principal Cities of the
United States and Foreign Countries.

W
WESTINGHOUSE ELECTRIC

# Westinghouse

64, No. 24 New York, December 13, 1924 Pages 983-1020

# ELECTRIC RAILWAY JOURNAL

RIS BUCK
ate Editor
SQUIER
ate Editor
A. MILLER, Jr.
ant Editor
MacMURRAY
Editor

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

CHARLES GORDON
Western Editor
Old Colony Bldg., Chicago
MERRILL E. KNOX
Editorial Assistant
Old Colony Bldg., Chicago
CARL W. STOCKS
Associate Editor

## CONTENTS

torials .....983

ckless Trolleys Give Improved Service to ohoes, N. Y. .....985
new route passes through the main business section, replacing ilway belt line. Residents in a large area now can reach central section in 4 minutes, as against 15 minutes pre-sly.

ermining the Average Length of Ride.....988

rett Shops of the Boston Elevated—II.....989
lumber storage building, outside lumber storage and dry illustrate advanced design and practice. For efficient han-g of materials improved equipment is used.

itrations Have Favored Neither Party.....992

R. T. to Operate 225 Gas-Electric Buses.....993
design departs materially from previous gas-electric drives. re control is by throttle of gasoline engine which drives rator. Motors are permanently connected direct to the rator, and power is transmitted by wheels to bevel gears.

Readers' Forum .....995

ociation News and Discussion .....996

lic Utility Problems Discussed in Pennsylvania .....996
ef from paving burdens, quantity production of renewal parts, operation, and relations with other utilities were subjects at twentieth annual convention of the Pennsylvania Street Rail-Association.

the City Pave and the Railway Maintain the avement .....997
A. T. DAVISON.

rating Experience with Buses.....998
B. HILBURN.
ious sources of trouble are pointed out. Better brakes, pro-n for overloads, six-cylinder engines for smoother starting, e dependable tires, larger capacity generators and high main-nce standards needed.

eres of Motor and Rail Transport Discussed at New ngland Conference .....1000

lway Operation of Buses in Connecticut .....1001
W. J. FLICKINGER.

nomics of Motor Bus Operation.....1003
EDWARD DANA.

viding Complete Transportation Service.....1004
L. S. STORRS.

v Englanders Discuss Maintenance and Employee elations .....1005

intenance of Equipment.....1006

ws of the Industry .....1009

Graw-Hill Company, Inc., Tenth Ave. at 36th St., New York

n H. McGRAW, President
CE J. BALDWIN, Vice-President
OLM MUIR, Vice-President
MEHREN, Vice-President
N BRITTON, Vice-President
n H. McGRAW, Jr., Vice-Pres. and Treas.
THOMPSON, Secretary

SHINGTON:
orado Building
AGO:
d Colony Building
ADELPHIA:
al Estate Trust Building
LAND:
der-News Building
OUIS:
r Building
FRANCISCO:
3 Mission Street
ON:
louverie Street, London, E. C. 4

Cable Address: "Machinist, N. Y."
Publishers of
*Engineering News-Record*
*American Machinist*
*Power*
*Chemical and Metallurgical Engineering*
*Coal Age*
*Engineering and Mining Journal-Press*
*Ingeniería Internacional*
*Bus Transportation*
*Electric Railway Journal*
*Electrical World*
*Electrical Merchandising*
*Journal of Electricity*
(*Published in San Francisco*)
*Industrial Engineer*
(*Published in Chicago*)
*Electrical Retailing*
(*Published in Chicago*)
*American Machinist*—*European Edition*
(*Published in London*)

1924

mber Associated Business Papers, Inc.
er Audit Bureau of Circulations

annual subscription rate is $4 in the United States, Canada, Mexico, Alaska, di, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, bia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brazil, , Uruguay, Costa Rica, Ecuador, Guatemala and Paraguay. Extra foreign ge to other countries $3 (total $7 or 29 shillings). Subscriptions may be sent e New York office or to the London office. Single copies, postage prepaid to any of the world, 20 cents.
ge of Address.—When change of address is ordered the new and the old address be given, notice to be received at least ten days before the change takes place.
right, 1924, by McGraw-Hill Company, Inc.
shed weekly. Entered as second-class matter, June 22, 1908, at the Post Office, w York, under the Act of March 3, 1879. Printed in U.S.A.

## *Thank You!*

"OF COURSE it takes a little time to answer these questions sent out every year by the ELECTRIC RAILWAY JOURNAL, but I figure that I ought to be willing to help the paper because the paper helps me."

This was the comment of a way engineer to one of the editors the other day who called just as the former was filling out one of the blank forms for the Annual Statistical Number.

It is just that spirit which makes possible the service the JOURNAL is able to render to its readers all through the year. Without the generous co-operation of the men of the electric railway industry it would be impossible to gather and publish the information that appears every week in this paper.

But because we do get this assistance, we are able to give our readers practical information concerning all the latest developments in the field. From the Bay of Fundy to the Gulf of California, information of all kinds concerning electric railway matters comes to us. Foreign countries furnish their share also.

Although we try to thank the individuals for the assistance they give us at the time it is rendered, we take this occasion to thank all collectively.

nber of Copies Printed, 6,250

Advertising Index—Alphabetical, 44; Classified, 40, 42; Searchlight Section, 39

# For the convenience of the public and the benefit of the industry

Good track! The most luxurious cars are luxurious only on good track. Snappy schedules can be maintained only on good track. Safety is certain only on good track. Maintenance of equipment is low only on good track. Maintenance of way is low only with good track. Minimum power consumption is possible only on good track.

Good track is literally the foundation of profitable operation. Good track is secured and maintained only through good welding and constant rail grinding. That's why the equipment here exhibited is used all over the world.

*See the exhibit at the right*
*Get a quotation now*

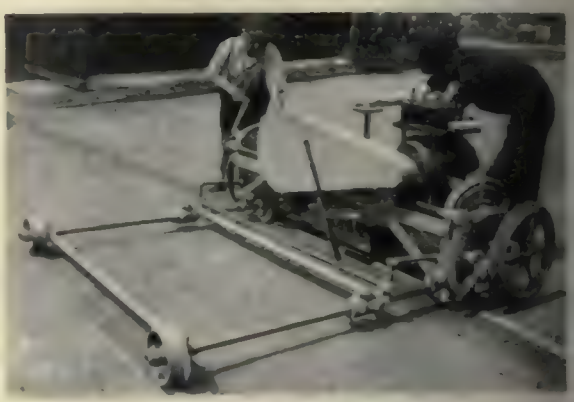
**Railway Track-work Co.**

3132-48 East Thompson Street, Philadelphia

AGENTS:
Chester F. Gailor, 30 Church St., New York
Chas. N. Wood Co., Boston
Electrical Engineering & Mfg. Co., Pittsburgh
Atlas Railway Supply Co., Chicago
Equipment & Engineering Co., London (331)



"Reciprocating" Track Grinder



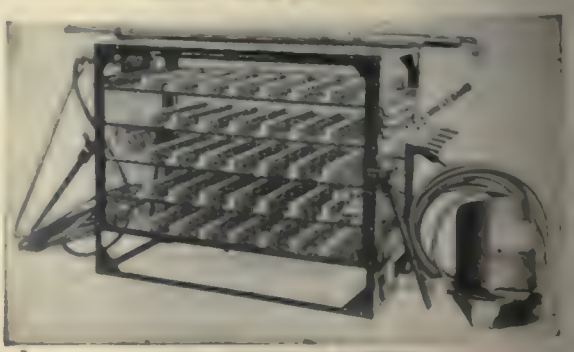
"Vulcan" Rail Joint Grinder



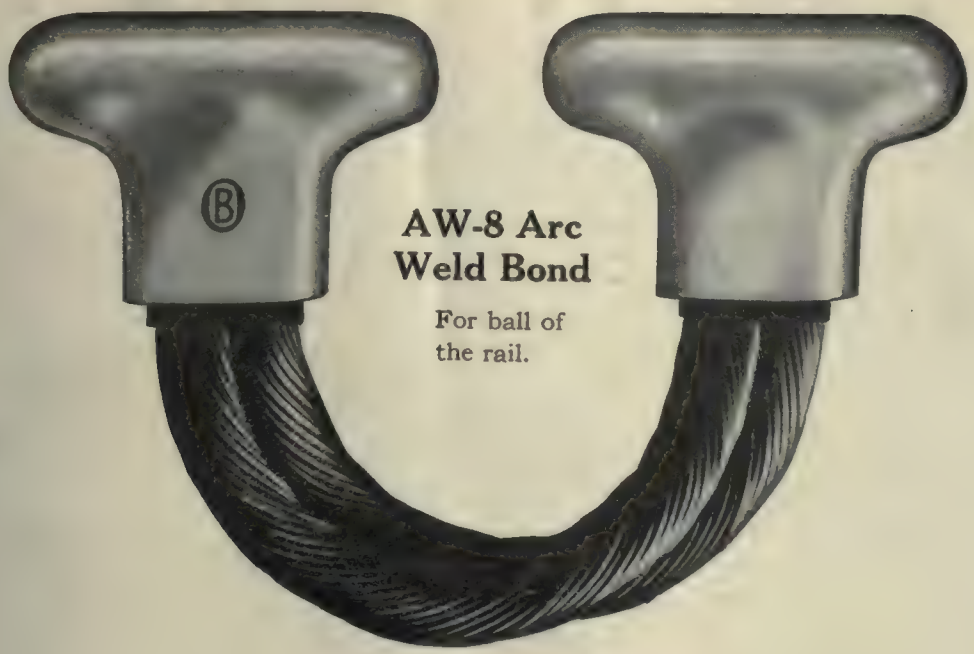
"Atlas" Rail Grinder



"Hercules" Swing Frame Rail Grinder

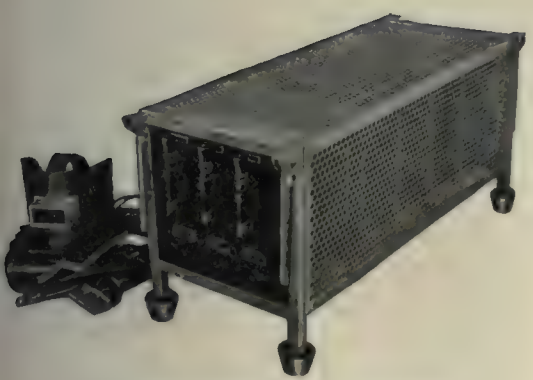


"Ajax" Electric Arc Welder



**AW-8 Arc Weld Bond**

For ball of the rail.



LW-Light weight resistance welder. Operates efficiently on 400 to 600 volts.

O-B Arc Weld Bonds—either for ball or base of the rail—are so easily welded that they are properly welded. O-B Light weight Resistance Welders are double insurance for the simplicity of the welding operation.

*Ask for your copy of Publication* 502



**AW-7 Arc Weld Bond**

For base of the rail
(cut shows one terminal only)

**The Ohio Brass Co.**
**Mansfield, Ohio, U.S.A.**

OLLEY MATERIAL — ELECTRIC RAILWAY CAR EQUIPMENT — RAIL BONDS — HIGH TENSION RCELAIN INSULATORS — THIRD RAIL INSULATORS
Dominion Insulator & Mfg. Co., Limited

NEW YORK — PHILADELPHIA — PITTSBURGH
CHICAGO — CHARLESTON, W. VA.
LOS ANGELES — SAN FRANCISCO — PARIS, FRANCE
Niagara Falls, Ontario, Canada

# CYCLONE

## "Galv-After" Chain Link FENCE FABRIC

*"—and so we settled the question permanently. We fenced to prevent theft and vandalism, and to guard would-be trespassers from danger. Entrances and exits are centralized, premises easily controlled."*



Cyclone "Galv-After" Chain Link Fence Fabric is the economical fence for rights-of-way, storage yards, power plants, car barns. Heavily Zinc-Coated (or Hot-Galvanized) by Hot-Dipping Process AFTER Weaving. Resists corrosion. Lasts years longer. No annual painting. "Galv-After" Fence Fabric is also built in removable panels for transformer station enclosures. Facilitates repairing and moving equipment.

We also manufacture Iron Fence for industrial uses. Attractive designs for inter-track and park fencing.

*Phone, Wire or Write nearest offices.*

**CYCLONE FENCE COMPANY**

*Factories and Offices:*

Waukegan, Ill. Cleveland, Ohio
Newark, N. J. Fort Worth, Texas

*Western Distributors:*

Standard Fence Co., Oakland, Calif.
Northwest Fence & Wire Works, Portland, Ore.

*The Mark of Quality* *Fence and Service*

PROPERTY PROTECTION PAYS



# All Permanent Materials Make Paved Track Renewable

The combination of the simple and permanent materials, *steel and concrete* with the ordinary methods of track and paving construction developed by fifteen years' experience of our users make Twin Tie Track renewable.

In its essentials the renewal feature of Steel Twin Tie Construction depends on the fact that there is nothing in such construction to absorb water to start cracks nor to rot and undermine rail and joints.

When you hear that such construction is lower in first cost than wood tie construction the rumor deserves intensive investigation.

**Write for all the data when you are ready to plan your 1925 Paved Work.**

**THE INTERNATIONAL STEEL TIE CO., Cleveland, Ohio**

# Steel Twin Tie Track

**Renewable Track · · Permanent Foundation**

*A compound for every electrical purpose*



Underwriters' Laboratories TESTED UNDER REEXAMINATION SERVICE

# MITCHELL-RAND MAKES MANY MIXTURES

Waxes, Pitches, Asphalts and Gums from every corner of the earth meet in the Mitchell-Rand receiving sheds, whence they are routed to the various fabricating units to be converted into commercial compounds:

Insulating, Impregnating, Sealing and Pothead Compounds that meet every mechanical requisite and electrical characteristic. Quantity production permits lowest selling prices and technical tests guarantee absolute uniformity.

M-R INSULATION MFG CO

**MITCHELL-RAND MFG. CO.,** 15 VESEY STREET NEW YORK, N. Y.

*It's easy to change!*




# KEYSTONE-HUNTER SIGNS

***Keep them fresh and up-to-date!***

THAT'S the beauty of Keystone-Hunter Signs!

If sign curtains become dirty and worn, or the names and routes need changing, a new curtain with up-to-date listing is inexpensive, and it's no trouble at all to install it.

Your signs are your best advertisements of service. Keep them in trim—clean, correct and legible. In the most exposed location on the car, it's only fair that signs should have a little attention and an occasional inspection.

***Consult our Catalog No. 7 for details.***

## ELECTRIC SERVICE SUPPLIES CO.

PHILADELPHIA
17th and Cambria Sts.

PITTSBURGH
829 Oliver Building

NEW YORK
50 Church St.

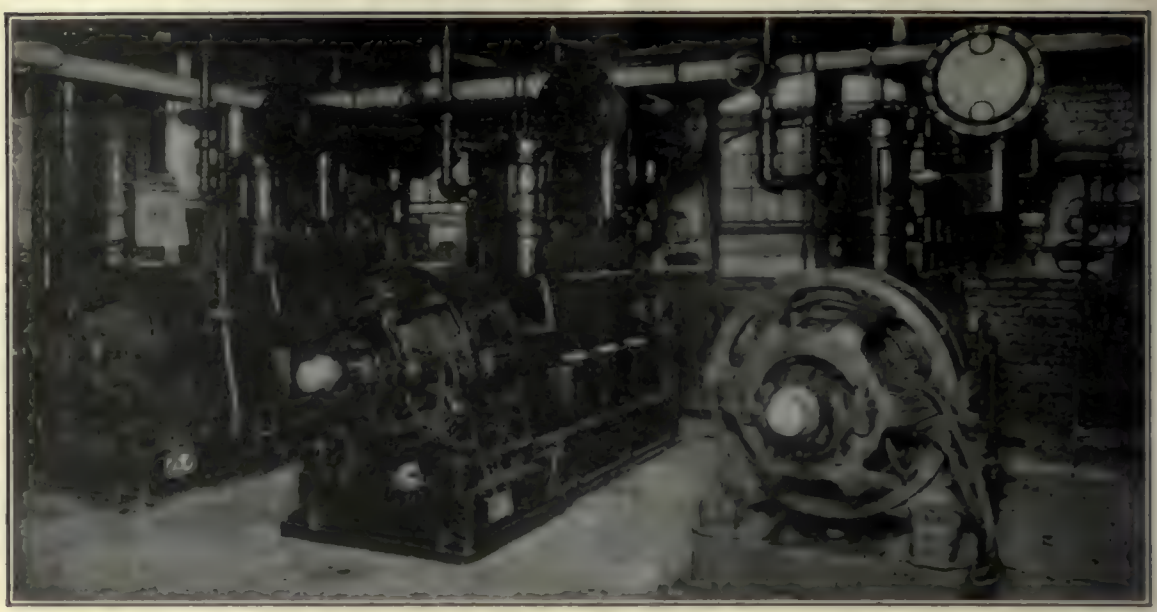
SCRANTON
316 N. Washington Ave.

CHICAGO
Monadnock Bldg.

BOSTON
88 Broad St.

Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Vancouver





# Low-Maintenance Air Compressors

*for*

**POWER HOUSES, CAR BARNS, and SHOPS**

The above illustration shows three of a battery of eight 3-VS high pressure compressors being used by a large street railway company.

Westinghouse-National Air Compressors are noted for their fine construction, their smooth, steady, economical service, their reputation for practically never wearing out, and their low maintenance requirements.

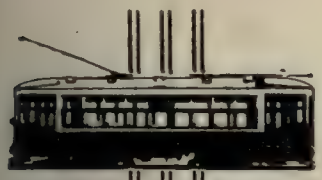
Many of these Compressors built 15 and 18 years ago are still giving first-class service.

Users of Westinghouse-National Compressors not only enjoy long service and low upkeep, but they also realize a saving in operating power through the HP Automatic Control, which stops the machine when sufficient pressure has been built up, and causes the Compressor to remain at rest until a new air supply is needed, when operation is resumed. No power is wasted.

**Westinghouse Traction Brake Company**
**General Office and Works: Wilmerding, Pa.**

# WESTINGHOUSE—NATIONAL

**"QUALITY MACHINES FOR QUALITY SERVICE"**





# Why?

## Why should you choose N. P. Equipment?

*Because*—it has been the established standard for years. Nothing experimental to try out on you.

*Because*—Its use on over 80% of the electric railway companies indicates its standing in the industry.

*Because*—National Pneumatic engineers are on the job with assistance and expert advice to help in planning your installation.

*Because*—National Pneumatic engineers are *also* on the job with bona fide service *after* the installation is made.

## NATIONAL PNEUMATIC

Door Engines

Door Operating Mechanisms

Manual, Pneumatic or Electric Control

Automatic Doors

Motorman's Signal Lights

**National Pneumatic Co., Inc.**

*Originators and Manufacturers*

***Executive Office:* 50 Church St., New York**

Philadelphia—1010 Colonial Trust Bldg. Chicago—940 McCormick Bldg.

General Works—Rahway, New Jersey

*Manufactured in Canada by*

Dominion Wheel & Foundries, Ltd., Toronto, Ont.

# For a "shor




FACTORY SECTION
Street Car Line
RESTRICTED
RESIDENTIAL SECTION
SHOPPING and BUSINESS SECTION

# *it" route —*

## etween shopping and residential sections— *use buses!*

he innumerable Mrs. Brown's and Mrs. mith's living in outlying suburbs and res- icted residential sections postpone many a ip to the city's shopping district because of he inconvenient, roundabout trolley routes vailable.

s a result potential revenue falls just short f the fare box.

f course such traffic would not warrant an xtension of car lines, even if the right of way ere available.

et the business is there and belongs to the ailway. How can it be brought in?

y Bus.

rogressive electric railways are turning more nd more to the bus as a solution to such roblems. The initial investment on buses is mall compared to car and track installation. atrons repay dependable, convenient auxiliary bus service with goodwill towards the railway supplying it. And if the buses are Mack Buses, with their pleasing lines and riding comfort, patronage is encouraged all 'round.

The Mack Bus is all bus,— from bumper to tail light. A perfectly co-ordinated transportation unit worked out in every detail by Mack bus engineers and built in the Mack plants. Mack supervision controls throughout. It shows in the long-life Mack engine, in the low bus chassis; in the wide front axle for safety and easy handling; in the dual reduction all bus rear axle, and in the exclusive Mack Shock Insulator suspension (all spring ends embedded in cushions of live rubber).

Mack Bus engineers will gladly discuss Mack roadworthiness, Mack economy, and Mack dependability in terms of adaptability to electric railway needs.

MACK TRUCKS, INC.
INTERNATIONAL MOTOR COMPANY
25 BROADWAY NEW YORK CITY

Eighty-three direct MACK factory branches operate under the titles of: "MACK MOTOR TRUCK COMPANY" and "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION."

*The Mack Bus*




Sedan Type Bus

*Performance counts!*

# This electric railway increases traffic with Pierce-Arrow Coaches



FOUR modern Pierce-Arrow six-cylinder motor coaches operated by the Joliet, Plainfield & Aurora Transportation Company have directly increased traffic.

"We have found that our motor coaches are a source of additional profit," says Mr. R. A. Moore, president of the railway, and also president of the Illinois Electric Railway Association.

Each coach, equipped with a 26-passenger, pay-enter type of body, covers an average of 250 miles daily during 18 hours of operation. Pierce-Arrow coaches were selected after an investigating committee had made an exhaustive study of all leading makes. They chose Pierce-Arrow because it met their exacting requirements as to comfort, speed, safety and economy.

The railway management likewise placed value upon the prestige which the name Pierce-Arrow holds with the riding public.

Our engineers will be glad to confer with railway representatives. A demonstration can be arranged at any of our many distributing points.

***Write for our catalog illustrating exterior and interior views of the various body types in which Pierce-Arrow motor coach chassis are offered.***

THE PIERCE-ARROW MOTOR CAR CO.
*Buffalo, N. Y.*

## Standard Chassis
## $4600

for 196-inch wheelbase, $4750 for 220-inch wheelbase, at Buffalo; including starter, battery, generator, solid tires and electric lights. Pneumatic tires and disc wheels optional at extra cost. Either chassis will accommodate the Sedan, sight-seeing or pay-enter types of wood or steel bodies, ranging from 18-passenger capacity upward.

*Terms if desired*

• • •

## The Pierce-Arrow 6-cylinder Bus Engine

The silent, dual-valve, dual-ignition Pierce-Arrow bus engine develops over 100 horsepower at 2500 revolutions per minute. It is so flexible that gear shifting is reduced to a minimum.

The bus is propelled by a trouble-free inverted worm gear drive. The low-hung chassis has an unusually short turning radius.

# PIERCE ARROW
# SIX-CYLINDER MOTOR BUSSES

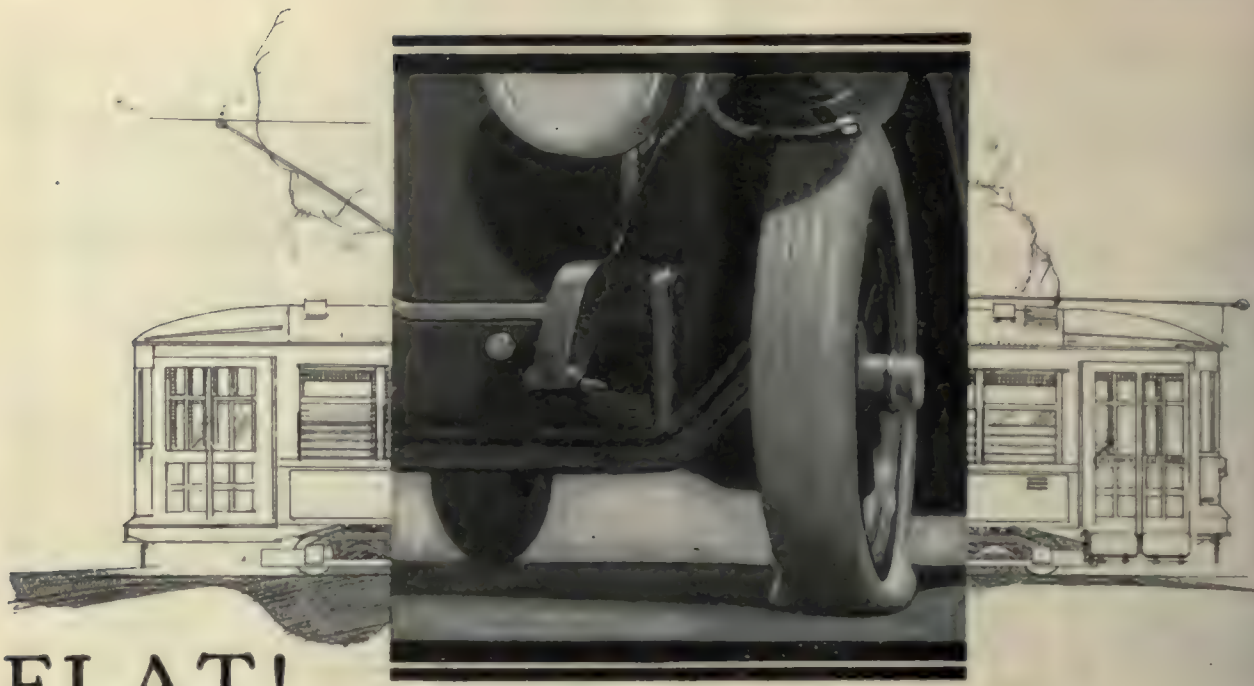
This is the way that moving pictures would show —

THE DIFFERENTIAL CAR

discharging its load clear of the track



he Differential Steel Car Co.
Findlay, Ohio



# FLAT!

## This Means a Change

TIME is lost! A "spare" must be on hand! It's hard work, often costly work, to make the change. To reduce such troubles in the automotive field, car and tire manufacturers have spent millions for research, for experiments and for improvements.

"Flats" are even more of a kill-joy in railway operation and maintenance. They, too, necessitate delays, labor, stocks of spares, and other costs.

To eliminate this source of money leak, many roads are turning to improved wheels. In Davis "One Wear" Steel Wheels, steel treads and flanges specially toughened by heat treatment resist the tendency to skid flat. They stand the gaff of high-power braking.

**AMERICAN STEEL FOUNDRIES**

NEW YORK CHICAGO ST. LOUIS

**DAVIS**

"ONE-WEAR"

**STEEL WHEELS**

# Galena Oils and Service



## Journal Insurance

GALENA ELECTRIC CAR OIL is a product specially developed and perfected to meet the exacting requirements of car journal lubrication.

It is a compounded oil of highest basic quality, so balanced in the essential properties of cohesion, adhesion and capillarity that it supplies positive and uniform lubrication to the bearing surfaces under the most severe service conditions.

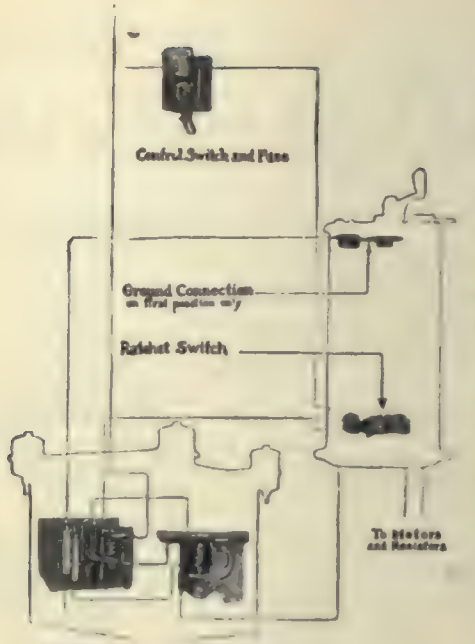
Stronger than other lubricants, it has greater endurance—yields a higher mileage return. Its extremely low coefficient of friction reduces power consumption and saves fuel. Its protective film lengthens the life of journals and bearings.

The efficient and economical lubrication performance of each and all of the electric railways using Galena Oils and Service is a practical and trustworthy reason for their adoption as an important aid in securing satisfactory operating results.

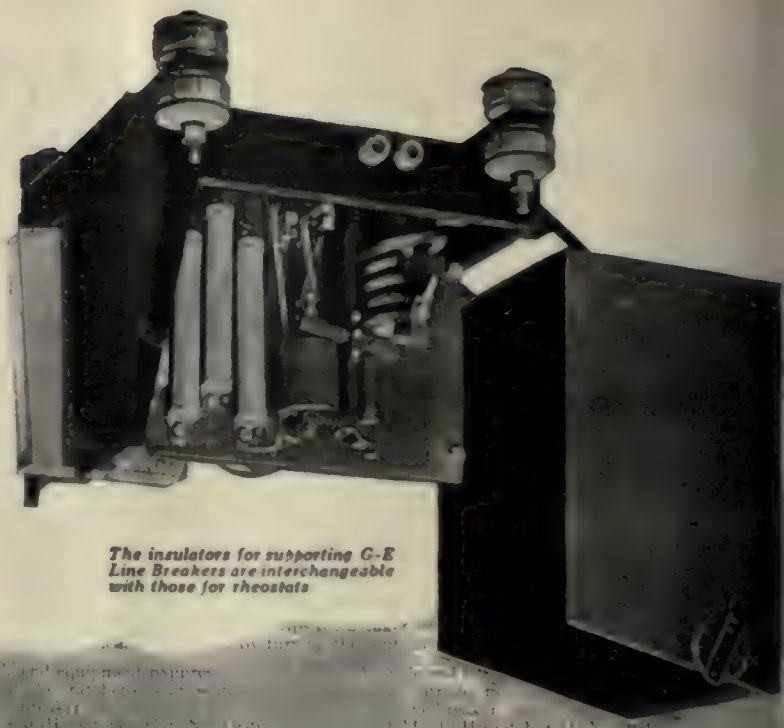
## Galena-Signal Oil Company

New York - Franklin, Pa. - Chicago

- and offices in principal cities -




Line Breaker under the Car
Consists of Overload Relay and Contactor with powerful magnetic Blowout



The insulators for supporting G-E Line Breakers are interchangeable with those for rheostats




*a page from your G-E Catalog*

# Controller Protection

G-E Line Breakers on thousands of cars are keeping controller maintenance costs down to a minimum.

The Line Breaker is for use with drum controllers. It reduces arcing and consequent wear on the controller fingers and segments. It has proved of great benefit also in protecting motors from improper acceleration. Since it is installed under the car it removes the arcing nuisance from the platform.

Another desirable feature of the Line Breaker is that it permits the interlocking of doors through the control circuit.

The operation of Line Breaker Equipment is explained in detail in your G-E Railway Supply Catalog. See page 178.

**Don't Purchase Supplies at Random**

**General Electric Company**
Schenectady, N. Y.
Sales Offices in all Large Cities

40-314

# GENERAL ELECTRIC

New York, Saturday, December 13, 1924

# Electric Railway Journal

*Consolidation of Street Railway Journal and Electric Railway Review*

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

*Volume 64*
*Number 24*

## Time to Tighten Up Toward Wage Increases

THE rising trend of wages in the electric railway field is causing uneasiness. There has been accumulating some doubt as to the fairness of the outcome of arbitrations, and the question is raised whether this method of settling wage disputes is falling down. Another question is whether fares, if further increased to meet higher labor costs, will produce the necessary increase in revenue. These are pertinent, vital questions.

Taking the long view of wage arbitrations, as seen in the data presented on page 992 covering the last five years, there does not seem to be justification for the fear that arbitration proceedings cannot be relied upon to produce on the average a fair decision. In this period practically as many cases have been decided for the companies as for the men. The disturbing thing perhaps is that nearly all arbitrations in the last two years have resulted in increased wages, despite the fact that the general trend of wages in all industry is not upward and that there has been no increase in the general cost of living. One or two recent arbitrations have notably disregarded the basic considerations and have no doubt given impetus to the questioning of the wisdom of submitting wages to arbitration.

However, the JOURNAL is inclined to feel that this five-year view of arbitration awards probably shows the matter up in about its true light, and that this need be discounted only to the extent that expertness on the part of the labor side in presenting its case may have come to have a bearing on the decisions of more recent years. This expertness results from an organized, experienced handling of the case on labor's part, as against the individual, largely inexperienced treatment on the part of the railway.

As to the question of fares, the present average for the street railways of the country is 7.17 cents. This compares with 6.95 cents a year ago, but with 7.24 cents in May, 1921, which was the high mark. In other words, the industry has already had an average fare 0.07 cent higher than that at present, which did bring increased revenue over previous rates. Hence, it is at least practical to say that fares could be increased some from the present level if wages necessitated. How much increase in fares would be productive of increase in revenue is problematical. For the individual companies whose fares are already up to about 10 cents, this question becomes extremely serious. If wages for these companies increase more, and the fare cannot be raised to advantage, then these railways have their backs to the wall, so to speak. They are without relief from fare adjustment and have only two courses open. They must be able to make other operating economies to offset the increased labor costs, or they must successfully withstand higher wage demands.

These situations at present are not numerous, but they do point to the necessity of a very determined resistance against further increases, especially where wages are already on such a level that average earnings are equal to or in excess of those in other industries.

## Abandonments Are Not Always Justified

SOME replacements of non-paying trolley lines by bus lines have taken place and figures have been presented to show how economies have been effected and sometimes additional traffic developed by the new service. Such facts are established beyond dispute in many cases. But now and then one familiar with the history of the case may well wonder whether, had the situation been handled differently, the trolley line could not have been made to pay, and perhaps to earn a return even greater than that possible by the new service.

A case may be cited to show the situation as it sometimes exists. An interurban electric line some 30 miles long connected two cities, the smaller of which has about 100,000 inhabitants. The railway was equipped with cars suitable for city service, geared for a maximum speed of only about 30 m.p.h. The power supply was poor. The d.c. power plant was nearly 20 miles away from one end of the line with feeders far too small for economical operation. In fact, the voltage drop was so great that on days of heavy traffic, when extra cars were run to handle the peaks, the cars would scarcely crawl up the steeper hills. The writer has in mind one section of the line where he observed the motorman throw his controller handle all the way around—and the car stood still. Not until an inspector issued orders for one car at a time to start did the car move.

The railway location was alongside the highway, but was separated from it, and the opportunity existed for fairly high speed running. But with stops every few hundred feet, it was not surprising that the cars took nearly three hours to go from terminal to terminal, the schedule speed being barely 12 m.p.h. With all these handicaps the road did a good business in the old days, when there was no other means of travel save a steam road that operated indifferently.

Naturally, when the automobile came, traffic fell off until it was deemed wise to abandon through service, and even to tear up portions of the track. As there was a need for through service, a bus line was started, making a limited schedule of less than two hours from the center of one city to the center of the other. Patronage was attracted at once, and the line has been quite successful.

The disappointing part is that it would have been possible to overcome most of the defects of the old

rail service. Purchased power with automatic substations properly located would have provided adequate power for a high-speed service without interruption and delay. Many local stops could have been eliminated and schedules as good as or better than those of the buses maintained. Light-weight, one-man interurban cars would have made possible ample service at much less cost than did the old cars. The new investment necessary would not have been excessive. The old investment in track and line, too, could have been preserved.

The case cited is one where inefficiency and indifference to the public's wants spelled the doom of the old line. It was not the failure of one kind of vehicle and the success of another; it was a failure of the management of the electric line. Such failures are too common, especially on the weaker properties. A bus line run the same way as the trolley line was run would have failed just as dismally.

Before deciding to abandon all service on non-paying rail lines, or to change the kind of system, it might be well to examine the defects of the present system. A correction of the faults in operation and the adoption of modern equipment and modern methods will perhaps save the property and make it profitable.

## New Car Proposed to Increase Subway Capacity

MUCH publicity is being given in one of the New York picture newspapers to a method "for increasing the capacity of the subways 100 per cent," according to the announcements. The plan is, briefly, to substitute double-deck cars for the present single-deck cars. While it is easy to publish freehand sketches showing how such cars would look, it is quite another matter to build and operate them with the restrictions imposed by the present structures. The headroom in the older subways is only some 12 ft. 6 in., although it might be possible to drop the track 6 in.

It must be realized that the introduction of double-deck cars would not increase the carrying capacity anything like 100 per cent. In the first place, with the floor dropped as low as possible and clear of the rail, space would have to be provided at the ends for the trucks, wheels and motors. The control and braking equipment also take space, and become a real problem in a low-floor vehicle. As the present station platforms are approximately 3 ft. 6 in. above the rail level, the necessary stairways in the cars up to the upper deck and down to the lower deck would take considerable room. Making allowance for all these points, a double-deck car could scarcely carry more than 50 per cent passenger capacity in excess of the present cars. There is also an element of danger in the stairways.

A better type of double-deck car was proposed by John P. Fox, a New York transit expert, over 20 years ago and described in the Boston *Herald* for Oct. 16, 1903. This was a two-level car, with separate doors for each deck and without stairways other than for emergency. Entrance and exit were to be made by means of two-story station platforms. Such an arrangement would simplify the car design materially, and would double the door space, so that the double-deck cars would load and unload perhaps even more quickly than the ordinary single-deck cars. The headroom needed for such a car would be 14 to 15 ft., or greater than that available in the New York subways. The use of such special cars would be practicable now, were new and independent subways constructed for the purpose.

Even if there were sufficient clearance, there are several drawbacks to the use of such cars as are now proposed. If the station platforms were modified for double-deck cars, the existing single-deck cars could not stop at them. As there are several thousand of the latter type of cars in use, such a modification of the platforms would not be feasible. The routing is so complex, and so many different lines operate over the same tracks, that it is improbable that any important routes could be selected for this proposed type of car.

## Another Way of Getting Subway Relief

ONE of the simplest methods of increasing the capacity of New York subways would be to use all tracks for express service. The principal rapid transit lines have four-track trunks through the heart of Manhattan, some of them continuing well out into the other boroughs before they divide into double-track branches. Express service is given on one pair of the tracks and local service on the other pair.

It has been demonstrated on practically all the lines that the local trains carry much smaller loads than the expresses. From the very nature of the service this must be so. The function of the locals is to pick up and distribute passengers who make one or both ends of the journey to local stations, but who combine it with a ride on an express. Even the plan which has been adopted in recent years of extending the local tracks into the suburbs has not served to fill the local cars, for all the riders who can, use the expresses until they are forced to transfer to the locals.

The local stations are patronized less than in proportion to the areas served by them. Where the walk is equal, the express station naturally is chosen. Patrons will sometimes walk past a local station to an express stop to avoid changing cars and the double wait.

Practically every rapid transit line in the city has directly above or below it a surface car line, many of which are not being used to capacity. By using such surface car lines as feeders and distributors for the rapid transit lines all or a large share of the local stations could be eliminated entirely so that the four-track subways could be converted into all-express lines. This would permit the present capacity to be nearly doubled, and without any additional expense whatever. In fact, there should be a saving on the rapid transit lines, as the schedule speed on the present local tracks would be increased materially, raising the car-miles to be obtained from a car-hour. Even some of the double-track elevateds and subways could be made express.

With the present state of chaos in which the surface lines have been thrown through receiverships and disintegration, the working out of such a plan would be beset by great difficulties. Then, too, traffic congestion is today at a point where drastic measures would have to be taken to speed up these surface cars. But with the rapid transit situation as desperate as it has become in New York City, a radical remedy must be resorted to if any kind of relief is to be obtained. Even though a comprehensive program of new construction is adopted, it will be years before the new lines can be made ready for service. Meanwhile anything that will aid in relieving the present intolerable conditions might well be given serious consideration, particularly when it involves no new construction or radical change in equipment or methods of operation.

# Trackless Trolleys Give Improved Service to Cohoes, N. Y.

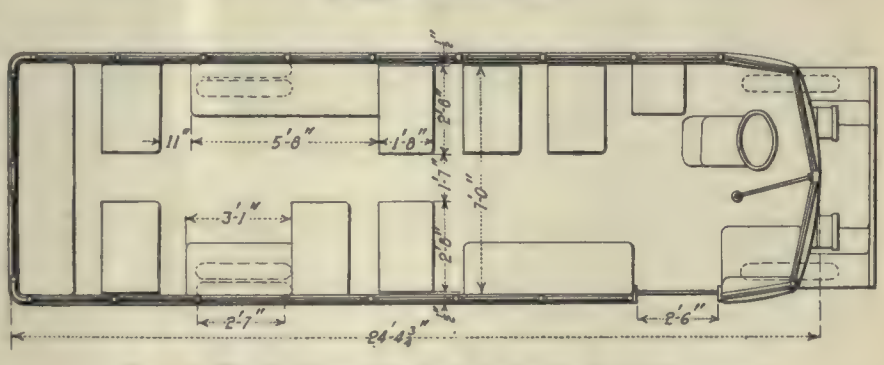
**The New Route Passes Through the Main Business Section, Replacing a Railway Belt Line—Residents in a Large Area Now Can Reach the Central Section in 4 Minutes, as Against 15 Minutes Previously**

OPERATION of trackless trolleys by the Capital District Transportation Company, a subsidiy of the United Traction Company Albany, began in Cohoes, N. Y., on ov. 1, as was announced in the Nov. 8 sue of the ELECTRIC RAILWAY JOURAL. Four trolley buses are used in e initial service. The routes over hich the trackless trolleys are opered and the electric car lines which ey replaced are shown on on accomnying map of the district.

Electric car service was previously erated over a belt line which exnded north as far as Manor Avenue, uth along Columbia Street, west as r as Simmons Avenue and east along ain and North Mohawk Streets. The siness section of Cohoes lies along ain and Remsen Streets and resints along the westerly part of elt line had to follow a roundabout ute if they took the electric cars wntown. In fact, residents along a rge part of this route could walk ross to the business section in less me than by taking the electric cars. he company was anxious to give imroved service to this section and beved that this could best be taken re of through a change in route so to operate west from the business nter and give a quick service to the sidents along the westerly part of e old belt line. This could be done more economically ith the trackless trolley than by building new track. That the company was correct in its diagnosis of e routing is shown by the increased riding which as resulted. On Nov. 3, two days after the trackless rolleys started, they carried 804 passengers. Riding creased steadily and on Nov. 15 1,735 passengers ere carried. Transportation figures of passengers arried by the belt line show that Nov. 14 a year ago, hich was an average day, 940 passengers were carried. he riding on the new trackless trolley is now well bove that of the old belt line, and the steady increase nows that additional vehicles soon will be required.



Receiving Passengers at the Manor Avenue Terminus of the Cohoes Trackless Trolley Line




Plan by Which Cohoes Trackless Trolley Seats 31 Passengers

### REASONS FOR DECIDING ON TRACKLESS TROLLEY

The use of trackless trolleys in place of electric cars as enabled the operating company to reduce its track nd paving expenses. The city of Cohoes decided to construct and repave streets on a considerable portion of the old belt line route. The revenue obtained from operation of railway service was insufficient for the company to assume this additional cost, but by the use of trackless trolleys this item of expense was eliminated, so that the company is in position to give greatly improved service. The fare charged is 7 cents, the same as on the cars of the United Traction Company. Free transfers are exchanged with connecting car lines.

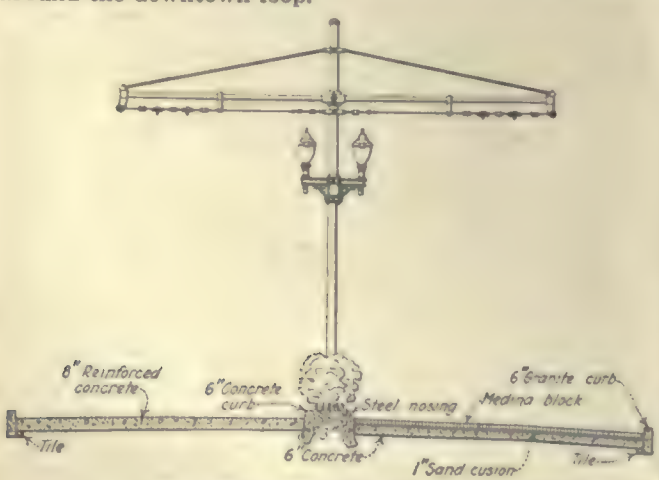
The length of the trackless trolley route from Simmons Avenue on the west to Manor Avenue on the north is 2½ miles. The running time in one direction is 18 minutes, with a 2-minute layover at each terminal. The original belt line mileage was 3.6 for northbound cars and 3.7 for southbound cars. The running time was 30 minutes. The trackless trolleys are thus making a schedule speed of 8.4 m.p.h., as against 7.3 m.p.h. for the belt line cars. More than 40 per cent of the trackless trolley route is over grades of from 5 to 8 per cent. This is another factor in favor of trackless trolley operation as compared with electric cars, since




Route of New Trackless Trolley Line and Belt Line on Which Service Has Been Discontinued

the 8 per cent grade is around a curve and trackless trolleys can negotiate the grade on a larger curve than would be possible with tracks. This is the first trackless trolley route through a business section that has been operated in the United States.

The car tracks along the westerly and southerly part of the old belt line route will be abandoned. Tracks on Columbia Street from Simmons Avenue to the railroad have already been removed and the street has been reconstructed and repaved. The tracks along Main, Remsen and North Mohawk Streets will be retained and electric service operated over these lines. The section along North Mohawk Street as far as Manor Avenue now has cars from Waterford, which previously operated around the downtown loop.




Center Pole Arrangement and Overhead Construction Used on Columbia Street

A considerable part of the route of the trackless trolleys is paved with granite block on a concrete base with cement grout, but brick, concrete, wood block and resurfaced granite block pavements are also found along the route.

The overhead construction for the trackless trolley is entirely independent of that for the railway. Two No. 00 copper trolley wires, spaced 24 in. apart, are suspended by ordinary ears and hangers to ⅜-in. span wires. The section of the route along Main, White and Remsen Streets also has double-track electric car lines. Here the additional overhead lines for the trolley buses are run at the side of the street and no attempt has been made to use the trolley wire of the car lines. In all cases the negative wires are laid outside, and in order to decrease the drop in potential the two positive wires and two negative wires are tied together about every 1,000 ft. Approximately ½ mile of the entire route is new construction, the other part of the route being over what was previously the belt line track. The poles previously used for the railway are used for the overhead of the trackless trolleys except where the operation is through new territory and along Columbia Street from Simmons Avenue to the railroad, which has been entirely reconstructed and repaved. This part of Columbia Street is 40 ft. wide and the new construction has provided a boulevard arrangement with poles down the center in a reservation 3 ft. wide inclosed by concrete curbs. The city intends to plant flowers and a hedge in this section, so as to beautify the street. The poles also support lighting fixtures, resulting in a decrease in the total number of poles from 11 to 4 in a single 400-ft. block. The sides of the street are thus relieved of pole construction, and a very attractive arrangement has resulted, as is shown in an accompanying illustration. As land was not available for con-

DETAILS OF TRACKLESS TROLLEY BUSES OPERATED IN COHOES, N. Y.

| | |
|---|---|
| Operating company | Capital District Transportation Company |
| Number of trackless trolleys operated | 4 |
| Chassis | Model J, Brockway Corporation with Clark axles |
| Wheelbase | 197 in. |
| Tires | General pneumatic cords 36 x 6, dual rears |
| Front tread | 5 ft 6 in. |
| Rear tread | 5 ft 11 in. |
| Turning radius inside wheels | 35 ft. |
| Body manufacturer | Wason Manufacturing Company |
| Length over all | 26 ft. 1½ in. |
| Height, pavement to top of roof | 9 ft. ⅛ in. |
| Height inside | 6 ft 6⅝ in. |
| Floor height above pavement | 2 ft. 4½ in. |
| First step above pavement | 15 in. |
| Second step height | 13 in. |
| Width inside | 7 ft. |
| Weight, total | 12,500 lb. |
| Seating capacity | 31 |
| Seats | Hale-Kilburn 208 de luxe |
| Seating material | Spanish leather |
| Interior trim | Mahogany |
| Headlining | Haskelite |
| Sides | Plymetl |
| Roof | Canvas |
| Window sash | Wood lined with brass, arranged to be raised |
| Window guards | Stationary |
| Ventilators | Nichols-Lintern |
| Car trimmings | Brass |
| Signal system | Faraday |
| Curtains | None |
| Destination signs | Hunter, roller |
| Doors and steps | Folding, hand operated |
| Heaters (with thermostatic control) | Consolidated |
| Headlights | Ohio Brass |
| Lamps, interior | 12 frosted, 36 watt |
| Lamp sockets | Lock type |
| Fare registers | Ohmer |
| Grab handles and rails | Porcelain |
| Hand straps | Sanitary |
| Gong | Consolidated, electric |
| Trolley equipment | Nuttall |
| Trolley catchers | Earll |
| Operator's curtain | Company's standard draw type |
| Motors | 2 GE 264 |
| Control | GE CR-14-B |
| Painting | Red body, cream trimmings, buff roof |



Overhead Construction Used with Trackless Trolleys. At Left, on Remsen Street, Where Trolley Buses Parallel Existing Electric Line. Center, Y Construction at Columbia Street Terminal. At Right, Overhead at Manor Avenue Terminal

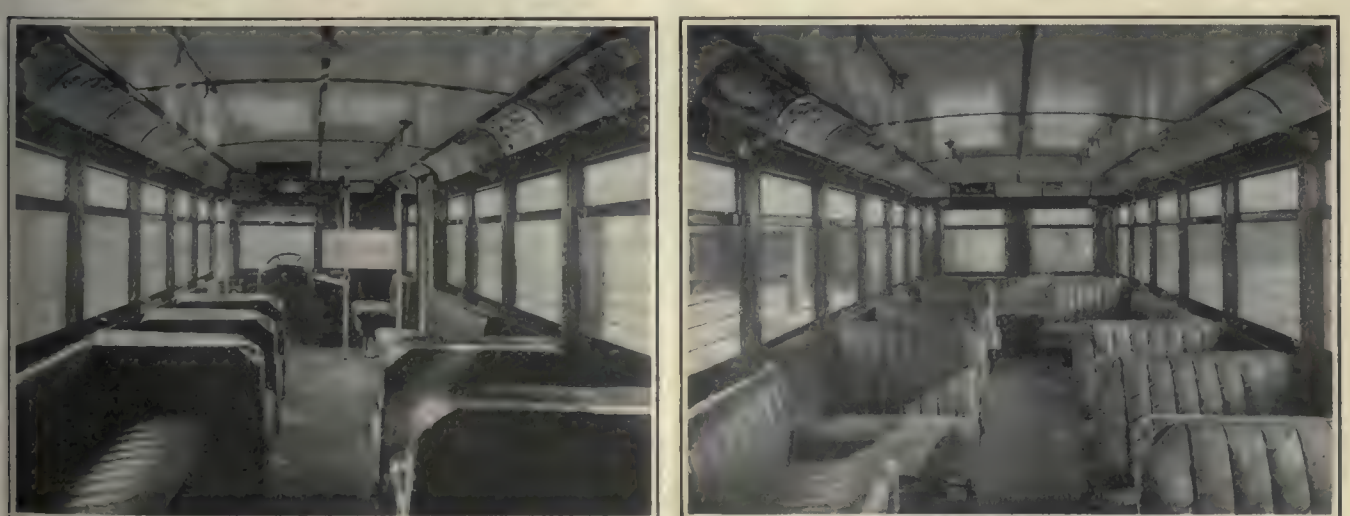
structing loops at the ends of the line a Y construction is used for reversing the vehicles.

In the design of the vehicles themselves, particular attention has been given to attractiveness and comfort. The bodies were built by the Wason Manufacturing Company, Springfield, Mass., and are mounted on Brockway chassis. The important details of construction and equipment are given in the accompanying table.

The over-all length of 26 ft. 1½ in. is the same as that of a standard 29-passenger gasoline bus. By extending the front part of the body, so as to utilize the space taken by the hood of a gasoline bus, a seating capacity of 31 has been obtained. An accompanying illustration shows the seating plan. Seats are comfortable, being of the de luxe type upholstered in Spanish leather. The longitudinal seat at the front end provides additional space for entrance and exit and is also convenient for standing passengers. The two longitudinal seats in the rear part of the body were necessary in order to utilize advantageously the space over the wheel housings. A clear height of 6 ft. 6⅛ in. inside is a convenience for standing passengers. Porcelain hand rails with sanitary hand straps are provided. The folding entrance doors provide a clear passageway of 2 ft. 6 in. Window posts are spaced 2 ft. 7 in. between centers, which gives eight large windows on the entrance side. Stationary window guards are installed, as the windows are arranged to be raised. The upper sash are stationary and glazed with white opaque glass. Interior illumination at night is provided by ten 36-watt lamps which have frosted globes and locking receptacles. The two rear lamps are located in front of openings in the rear wall fitted with colored lenses so as to serve as marker lights. While the lamps are along the side of the car over the windows, the type of fixture used brings them out for a distance of approximately 12 in.

The wiring for the signal system also runs in the same section with the light wiring. A push button is located over the center of each window. This location simplifies the wiring considerably, as splices are not needed at each window post, as would be necessary if the signal buttons were installed on the window posts. Electric heaters, equipped with thermostatic control, provide a comfortable interior temperature at all times. An emergency door in the rear right-hand side swings outward together with the window which occupies the panel. The latch for releasing the door is installed in a glass case within the body, so that it must be broken to open the door.

The power for propulsion is provided by two tandem-connected General Electric type 264 motors, which have a rating of 25 hp. each. The control equipment is General Electric type C-154-B contactor type. The operating company is now conducting tests of a control equipment with automatic acceleration and also of regenerative braking for this type of vehicle. The present motor control equipment is actuated by the left-hand pedal, while the right-hand pedal is for braking. A signal lamp of the Consolidated Car Heating Company's type is connected in the control circuit so as to show when the full series position of the control has been reached. Each bus is also equipped with a Consolidated electric gong, which is controlled by a push botton.



Comfortable Interior Attracts Riders to the Trolley Bus. At Left, Looking Toward Operating End. At Right, From Operating End

The color scheme for painting is the standard used by the United Traction Company and consists of a red body, cream window posts and a buff roof.

In regard to the advantages of trackless trolley vehicles over gasoline buses, Ernest M. Murphy, general manager of the United Traction Company, stated that due to the many curves and severe grades which this line contains and provision for rapid acceleration, the power demand is heavy. The motor equipment provided has a higher rating and a greater overload capacity than is ordinarily furnished for the corresponding gasoline-driven bus. There is also an advantage in that the motors used are of a type standard on some of the electric cars of the United Traction Company.

The trackless trolley vehicles have a low center of gravity, which permits an increased height, and thus gives increased comfort to standing passengers. The body has also been extended the full length of the chassis, so as to provide an increased number of seats with greater comfort to seated passengers. The present maintenance forces are familiar with the inspection and repair of electric car equipment and so the addition of the trackless trolleys required no addition to the company's maintenance forces. As power is supplied by a central station instead of from individual engines, as is necessary with gasoline-driven units, the trackless trolleys are cheaper to operate and to maintain. In addition, they are in the shop a considerably smaller portion of the time. There are many other conveniences, such as better lighting and heating, and convenience for control of the various operating devices that present a much simpler arrangement on the trackless trolley.

# Determining the Average Length of Ride*

### Method Proposed in Connection with Mail Pay Reduces the Number of Observers Needed to Take Field Data—Load Factor Can Be Quickly Determined

IN THE brief submitted by the railway mail pay committee of the American Electric Railway Association, which was presented in the railway mail pay case before the post office department at Washington, a new method of determining the average length of ride on urban railways was proposed. The plan was the work of W. H. Maltbie, special counsel of the United Railways & Electric Company, Baltimore, Md., as attorney for the railway mail pay committee.

Comparatively few accurate determinations of load factor have been made in the past for member companies, so that the amount of evidence which could be presented to the Interstate Commerce Commission as to direct determinations of load factor was relatively limited. A number of other companies, however, have made direct studies as to the average length of ride, and it was possible by a consideration of the configuration and area of American cities, supplemented by the experience of specialists who have worked in traffic surveys, to reach a maximum figure for the average length of ride for the average municipal area. Moreover, the figures furnished by the member companies in the mail pay study made it possible to determine the average seating capacity of the cars used by member companies; while the average number of revenue passengers per car-mile, representing the average number of persons who board each car per mile, is a well-known and daily constant figure for the industry.

These figures are connected by the relation:

$$\frac{\text{Revenue passengers per car-mile} \times \text{Average length of ride}}{\text{Average seating capacity of car}} = \text{Load factor}$$

This formula was used in the argument on the mail pay case.

It is evident at once, however, that the product of the average number of revenue passengers per car-mile by the average length of the ride is the average number of riders upon the car. This fact suggests at once a new method of determining the average length of ride and the load factor for the entire system, for any definite portion of the system, for any day of the week, for any definite hour of the day or even for a single trip.

This new method is extremely simple. It consists merely in placing a single observer on each car on a given line, in a position from which he can command a view of the interior of the car, and directing him to count the number of passengers actually on board the car at definite intervals on the system, that is, for each mile, half mile, or quarter mile. The sum total of his observations divided by the number of counts yields the average number of passengers riding upon the car. This number divided by the seating capacity of the car furnishes the load factor, or divided by the number of revenue passengers per car-mile gives the average length of ride upon that certain line.

The simplicity of this method and its relative inexpensiveness are evident when it is contrasted with the methods formerly in use. The original method, using an origin-to-destination check, involves not only a tremendous amount of clerical work, but also the full cooperation of the riding public. A later method, using on-and-off studies, involves two men upon each car studied and a large amount of clerical work in the determination of the total passenger-miles.

The new method involves only one man upon each car studied and no computation other than the addition of his counts and the division of the total by the number of counts made.

*This article is based on material included in the briefs submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

## Striped Dasher of Little Advantage

THE method of painting car dashers with stripes to make the car appear wider as practiced at Schenectady, N.Y., and described in ELECTRIC RAILWAY JOURNAL for Nov. 1, page 760, has not given as good results as were anticipated. After keeping statistics of accidents for three or four months the practice was discontinued. Since that time there has been a steady reduction in the number of accidents and also in their cost, although there has been an increase in number of automobiles over two years ago, amounting to nearly 70 per cent. The improved accident record, however, may have come from the added experience of the newer automobile drivers as the summer season advanced.

The Berlin Street Railway is erecting apartment houses near its shops and depots for the housing of its personnel. On Oct. 17 one apartment block, containing 272 apartments, was officially opened. Altogether about 1,000 such apartments will be provided.

# New Boston "L" Lumber Storage and Kiln

## *Second Article*

**The Lumber Storage Building, Outside Lumber Storage and Dry Kiln for the New Everett Shops, Boston, Illustrate Advanced Design and Practice—For Efficient Handling of Materials Improved Equipment Is Used**



**The Transferway Constitutes the Main Axis for the New Boston Shop—The Paint Shop Is on the Left and the Kiln Building and Wood Mill on the Right**

IN THE present article on the new Everett car repair shops of the Boston Elevated Railway the improved facilities for handling and treating lumber are described. An outline of the reasons for the construction of the new shops, with a description of the boiler plant, heating installation and power supply, was published in the ELECTRIC RAILWAY JOURNAL for Nov. 22, page 871.

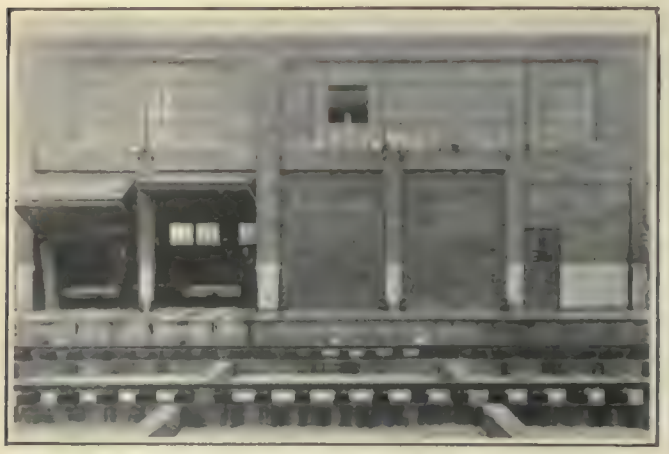
The main axis of the shops is a transferway 80 ft. wide, extending from the southerly end of the yard northerly to the site of the future wheel and axle shop. This may be seen by reference to the general plan on page 872 of the Nov. 22 article. On the west side of the transferway are already built the wood shop, dry kiln and lumber storage building, and in the upper southwest corner of the property is a section of the yard devoted to the outdoor storage of lumber. The lumber storage building and dry kiln building are each 80 ft. square, and are located between the wood mill and the lumber yard. Each is two stories high and the wood mill, about 364 x 158 ft., is one story in height with the exception of a balcony on the west side used as a carpenter shop.

### THE HOT-BLAST DRY KILN HAS TWO TRACKS

The kiln building, also containing storage space, contains a modern two-track Sturtevant hot-blast lumber kiln with humidity feature, fully equipped, and has bi-folding doors of the jack-knife type set flush with steel-frame openings. Half the first floor is used in kiln work and has two tracks which extend from end to end and thence to the transferway. The remainder of the first story is used for heavy metal storage and the second floor for the storage of light parts and miscellaneous equipment. Details of the ducts for the heated air are shown in the accompanying line drawing.

The first floor of the lumber storage building is utilized for the storage of heavy lumber under cover, the second floor being employed in the storage of lumber under heat. In the northwest corner is a baling room for sawdust and shavings which are piped over from the millroom.

Most of the lumber used at the Everett shops arrives by the steam railroad connections on the west side of the property and is unloaded by hand from cars on spur tracks serving the yard on the west side of the transferway and south of the kiln building. The yard will hold about 350,000 ft. of lumber, or 7 months supply. From this yard a passageway about 15 ft. wide runs between the kiln and lumber storage buildings, terminating at the wood mill, and three tracks laid at right angles to the transferway axis facilitate shifting of cars along the sides of the kiln and storage buildings and parallel to the millroom doors. The lumber is piled as needed on four-wheeled hand trucks carrying



Exterior of Dry Kiln with Entrance to Provide Service from the Transferway



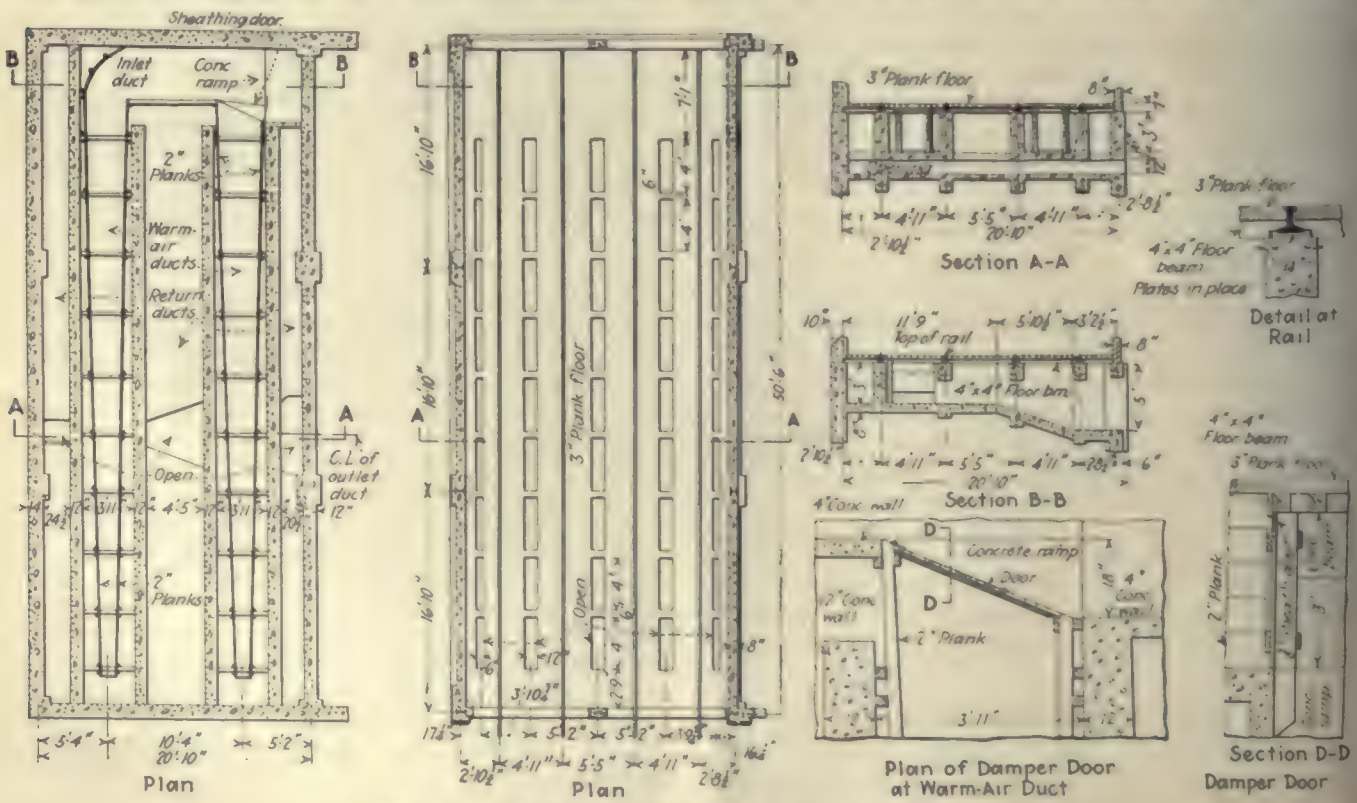
Interior of Dry Lumber Kiln Showing the Trucks, Gratings and Ventilating Arrangement

about 1,000 board-feet each for convenient distribution about the millroom or lumber storage building. For kiln drying it is stacked on special kiln cars or is moved on flat cars by the aid of the transfer table and a service car to any desired point served by the yard and building trackage. If desired, motor truck loads of lumber can easily be delivered into this group of buildings. It is also readily possible to unload lumber directly from the flat cars into the storage building by shifting them through the yard to the transferway and thence to the appropriate track paralleling the side doors of the building.

The kiln proper consists of a single heating compartment containing two parallel tracks, each capable of accommodating two special flat cars and giving a total capacity of 24,000 board-feet of lumber for simultaneous treatment. The kiln proper is about 50 ft. long by 21 ft. wide. The rails are laid to standard gage on reinforced concrete beams, and a 3-in. plank flooring is provided with the wearing surface flush with the rail top. Under each track between the rails a row of ducts supplies hot air to the charges of lumber. The return ducts are in the floor outside of the kiln tracks, with a single large return duct running through the center of the kiln. These ducts are covered with gratings assembled from iron bars of ¼-in. x 1¼-in. section, spaced 1 in. apart. In general these cover louvered openings 4 ft. long by 12 in. wide below the floor level and average 9 in. wide at the outlet. Forty-five gratings are provided for the complete kiln, of which 27 are used as returns to the duct system. The louvers are operated by a stick from the floor.

### Circulating the Hot Air

Heated air for kiln service is supplied by a 5-hp. motor-driven fan mounted in the basement of the kiln building and arranged to draw air through a chamber containing steam coils before it enters the supply ducts. This heating chamber, a sheet-iron box adjoining the fan housing, is also equipped with a steam




Plan of Kiln Building with Sections of Duct Construction

t by which the degree of humidity in the entering can be controlled. The kiln room proper contains lines of 1¼-in. pipe laid between the rails and ing a large number of ¼-in. outlets for the discharge ive steam directly into the kiln. The return ducts end the entire length of the two sides of the kiln under its center, the three being merged together he west end and carried back to the fan room for eating of the air. The ducts thus provide a con- ious recirculation of air from the supply ducts up the center of each load of lumber and outward ough the return ducts to the rear of the heating . The maximum steam pressure required is 10 lb. he fan is designed to supply five changes of air per ute through the lumber pile at approximately 1 in. ic pressure. The kiln will maintain temperatures to 150 deg. F. Thermostatic controls of temperature humidity are installed on the wall of the kiln room also in the fan room. A Powers regulating valve trols the steam supplied to the coils in the heating mber, and the installation includes a recording chrometer (registering continuous wet and dry bulb peratures) with tubing directly connected to a nt in the supply duct system where the maximum ing conditions prevail in the kiln; indicating rometers and testing instruments to determine the sture content of the lumber. A 660-watt, 110-volt tric oven supplied by E. H. Sargent & Company, cago, is provided to test the moisture content of ber samples. The kiln-drying system was furnished the B. F. Sturtevant Company, Boston, and the ording instruments by the Foxboro Company.

### UMBER STACKED TO GIVE FREE AIR CIRCULATION

umber to be kiln-dried is stacked on special trucks, h air spaces between the boards, and is hauled by a vice car to the transferway. The spacers are x 1⅜ in. cross-section. From the transfer table the ber trucks are pushed into the kiln. The kiln tment varies somewhat according to the kind of ber in hand and its condition. Whitewood of all s is first live-steamed for four hours at about 10 lb. square inch, in order to saturate the fibers thor- hly. The stock is then soaking wet to the heart of wood. Steam is shut off and the blower started, mall amount of steam being let into the hot-air mber of the air-duct system as air is admitted. supply of hot air is continued for 5 to 6 days, lumber being inspected daily to see if the sap is ing off at the proper rate and if the drying is ceeding normally. Should the temperature run too h the lumber tends to curl and if the heating is wed to continue at an excessive rate warping and eycombing may follow. The automatic control is iable in preventing fluctuations of temperature humidity after the proper values have been deter- ed. On the last day in drying whitewood the mois- is cut off and the work finished with hot air alone. ogany is given about the same treatment as white- d. The same is true of oak, except that in handling en wet-sawed stock it is steam-heated at 100 to 120 , followed by 6 to 8 days of kiln drying up to a imum of 140 deg. Three-inch maple is steamed n 3 to 5 hours at 100 to 120 deg., followed by 10 to lays of kiln drying at 140 to 150 deg. Eight days ng generally suffices for 1-in. and 1½-in. maple. ut 24,000 ft. of lumber was kiln-dried here in a nt 3-weeks period.

The lumber storage building is equipped with six dry rooms on the second floor, each having double-sheathed wooden partitions and doors, and heated by coils supported on the floor over which the lumber is piled. The central portion of the building is open and skylighted to provide for convenient handling of lumber to and from the lower floor. The lumber is either transported to the south door of the storage building on a kiln car or brought in on a hand truck. The compartments on the second floor are capable of holding 17,000 ft. of lumber each, packed 9 ft. high, and are each 16 ft. square inside. One is utilized in the hot storage of soft pine of 1½-in. size, the next for hot storage of 1-in. pine and the next for dry storage of mahogany and 1-in. whitewood. The bins on the opposite side are assigned to the dry storage of 1½-in. whitewood, oak, ash and cherry. The kiln-drying process is used on sizes of pine above 1½ in. thick, the smaller sizes being hot-dried in the storage house for about 2 weeks at temperatures of from 100 to 150 deg.



The Dry Lumber Storage Has Six Rooms, Each 16 Ft. Square, and Heated by Steam Coils

Air-dried stock is stored under the second floor compartments. These are provided with balconies 3 ft. wide reached by short ladders at the end of the building. They are electrically lighted and equipped with automatic sprinklers and ventilating openings near the top and bottom of the doors.

To facilitate handling lumber from the first floor to the bins above, a detachable wooden roller 4 ft. long and of 4 in. diameter is placed in sockets in front of the required bin at the walkway edge, this taking a considerable portion of the weight of the board from the handlers on the floor and balcony. On the ground floor another convenience in holding boards on the diagonal when passing them up or down is a metal pin inserted in a portable stanchion about 4 ft. high, the handler allowing the board to rest in part against this pin when pausing in the work. In general the steam valves controlling the heating coils in the storage compartments are near the second floor level and close to the doorways.

The kiln building cost $9.51 per square foot of floor space, including equipment, and the lumber storage building cost $7.89 per square foot.

The lumber storage building is connected with the wood mill by a bridge which provides access to the sawdust and shavings separating hopper above the baling room and helps support the dust discharge piping and a steam line feeding the hot storage compartment coils.

## English Locomotives for Montreal

FOUR locomotives for use on the new electrified harbor railway at Montreal will be delivered in the near future. They are equipped for operation at 2,400 volts d.c. and have been built by the English Electric Company, Ltd., at a total cost of $478,650. The total weight on the drivers is 200,000 lb. Each locomotive will have a nominal 1-hour tractive effort of 40,000 lb. at a speed of 15 m.p.h. and a maximum tractive effort of 60,000 lb. for 5 minutes.

The locomotives are of the box-cab, double-truck, articulated running-gear type and are provided with twin-gear drive. All the weight is carried on the four driving axles. Each truck is side-equalized and one truck is cross-equalized. Total length inside the knuckles is 39 ft. The diameter of the driving wheels is 50 in.

The cab is divided into three compartments, the central of which contains the control gear and auxiliary machinery. On one end the driving compartment is wider than the main body of the locomotive and has windows in the rear so that a better view of the track can be obtained during shunting operations. This wider compartment is equipped with two driving positions, one facing the front and the other facing the rear. The interior of the cab is lined with heat-insulating material to prevent condensation which might occur on account of temperature changes.

Current collection is accomplished by two pa tographs. Control is of the camshaft type. Tw Dick-Kerr motors are mounted on each truck.

## Arbitrations Have Favored Neither Party

A FIVE-YEAR view of the results of arbitratio of wage disputes between electric railways a their employees shows that one side has won about often as the other. The results of a study made by t JOURNAL are summarized and detailed in the acco

SUMMARY OF ARBITRATION RESULTS

| | Number of Arbitrations | Won by Men | Won by Compan |
|---|---|---|---|
| 1920 | 21 | 19 | 2 |
| 1921 | 24 | 2 | 22 |
| 1922 | 12 | 1 | 11 |
| 1923 | 11 | 11 | 0 |
| 1924 | 14 | 12 | 2 |
| Totals | 82 | 45 | 37 |

panying two tables. Of a total of 82 cases during th years 1920–1924, the boards of arbitration found f the men in 42, while in 37 cases they found for the co pany. In 1920, practically all decisions were for t men. In 1921 and 1922 practically all were for t companies. In 1923 and 1924, the tables reverse again, as practically all decisions favored the men.

DETAIL RESULTS OF WAGE ARBITRATIONS DURING LAST FIVE YEARS

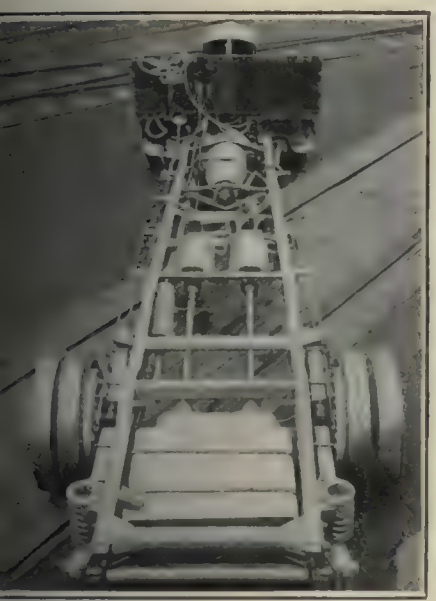
| Company | Awards: Cents or Per Cent Increase in Maximum Rate Per Hour | Reference in Journal |
|---|---|---|
| **1920** | | |
| Key Route, Oakland, Calif | 12½% | Jan. 24, p. 210 |
| Georgia Ry. & Pr. Co., Atlanta | 15% | Mar. 27, p. 663 |
| Denver Tramway | 10c. | April 3, p. 720 |
| Des Moines City Railway | 13c.(*) | May 29, p. 1112 |
| Boston Elevated | 10c. | June 19, p. 1276 |
| Ottawa Electric Railway | 10c. | June 19, p. 1276 |
| Colo. Springs & Cripple Creek Ry. | 48c.* | June 26, p. 1321 |
| N. Y. State Railways, Rochester, Syracuse & Utica Lines | 33⅓% | July 3, p. 30 |
| Toronto Railway | No change (3) | July 3, p. 33 |
| Tri-City Railway & Light Co., Davenport, Iowa | 10c. | July 10, p. 89 |
| Scranton Railway | 20% | July 10, p. 91 |
| E. St. Louis & Suburban Railway | 40 to 52% | July 24, p. 186 |
| Twin City Rapid Transit Co. | 10c. | July 31, p. 218 |
| Montreal Tramways | 25 to 30% | Aug. 21, p. 377 |
| Cincinnati Traction Company | 9c. | Aug. 21, p. 378 |
| Winnipeg Electric Railway | 10% | Aug. 21, p. 381 |
| Omaha & Council Bluffs St. Ry. | No change (3) | Aug. 28, p. 428 |
| Eastern Massachusetts St. Ry. | 11c. | Sept. 18, p. 567 |
| Kentucky Traction & Term. Co. | 7c. | |
| New Orleans Railway & Lt. Co. | 30% | Sept. 25, p. 612 |
| Cincinnati, Newport & Covington Railway | 20% | Oct. 16, p. 841 |
| **1921** | | |
| Kentucky Traction & Term. Co. | — 5½c. | May 7, p. 869 |
| Eastern Massachusetts St. Ry. | —12½% | May 21, p. 963 |
| Utah Light & Traction Company | —12½% | June 18, p. 1143 |
| Wheeling Traction Company | No change (4) | June 18, p. 1139 |
| Cleveland, Southwestern & Columbus Traction Co. / Cleveland, Painesville & Eastern Traction Co. | —12c. | June 18, p. 1139 |
| New York State Railways | —11.7% | |
| Cincinnati & Dayton Trac. Co. | — 7c. | June 25, p. 1178 |
| Des Moines City Railway | —11c. | July 16, p. 108 |
| Youngstown & Ohio River R.R. | — 5c. | July 30, p. 177 |
| Rochester & Syracuse Railway | —16⅔% | July 30, p. 179 |
| Northern Ohio Traction & Lt. Co. | (—15c.)—1 to 2c. lower than company asked | Aug. 6, p. 217 |
| Mass. Northeastern Elec. Railway | —12% | Aug. 20, p. 293 |
| Memphis Street Railway | — 4c. | Aug. 27, p. 332 |
| Middlesex & Boston Street Ry. | —15% | Sept. 10, p. 414 |
| Topeka Railway | — 7½ to 10% | Sept. 17, p. 453 |
| Auburn & Syracuse Electric R.R. | —14c. freight / —14c. interburban / —12c. city | Sept. 24, p. 531 |
| Schenectady Railway | No change (4) | Oct. 1, p. 562 |
| Montreal Tramways | —12½% (1) | Oct. 1, p. 566 |
| Connecticut Company | — 8⅓% | Oct. 22, p. 751 |
| East St. Louis & Suburban Ry. | — 3c. | Dec. 10, p. 1042 |
| British Columbia Electric Ry. | —10% | Dec. 24, p. 1125 |
| Boston & Worcester Street Ry. | —10% | Dec. 31, p. 1155 |
| **1922** | | |
| British Columbia Electric Railway, Vancouver, B.C. | —10% | Jan. 14, p. |
| Cincinnati Traction | —20% | Jan. 21, p. |
| Hull Electric Railway | ..... | Feb. 11, p. |
| Attleboro Branch Railroad / Interstate Consolidated St. Ry. / Milford, Attleboro & Woonsocket Street Railway / Springfield, Worcester Con. St. Ry | —10c. | Mar. 4, p. |
| Columbus, Newark & Zanesville Railway / Indiana, Columbus & Eastern Ry. | — 2c. | May 6, p. |
| Cleveland Railway | —10% | May 20, p. |
| Georgia Ry. & Pr. Co., Atlanta | —12½% | June 3, p. |
| Connecticut Company | — 5 4⅝% | June 17, p. |
| Tri-City Railway | No change (3) | June 17, p. |
| Chicago Elevated Railways | —10% | Aug. 19, p. |
| Chicago Surface Lines | —10% | Aug. 19, p. |
| Cincinnati Street Railway | — 4% | July 29, p. |
| Berkshire Street Railway | No change (4) | Dec. 7, p. |
| **1923** | | |
| Cleveland Railway | 5c. | May 26, p. |
| Scranton Railway | 3 to 5c. | July 7, p. |
| Youngstown & Ohio River R.R. | 5c. | July 21, p. |
| Chicago Surface Lines | 3c. for first year of contract; 2c. more for second. | July 28, p. |
| Chicago Rapid Transit Co. | 3c. for first year of contract; 2c. more for second. | Aug. 4, p. |
| Cincinnati Traction Co. | 5c. | Aug. 18, p. |
| Grand Rapids Railway | 3c. | Aug. 18, p. |
| Detroit Department of St. Rys. | 5½ to 7½c. | Aug. 25, p. |
| British Columbia Electric Railway, Vancouver, B.C. | 3½c. | Oct. 6, p. |
| E. St. Louis & Suburban Railway | 3c. | Sept. 29, p. |
| Boston Elevated Railway | 9c. | Oct. 20, p. |
| **1924** | | |
| Middlesex & Boston Street Ry. | 4c. | Feb. 16, p. |
| Augusta-Aiken Ry. & Elec. Co. | 2½c. | Mar. 15, p. |
| Georgia Ry. & Pr. Co., Atlanta | 3c. | April 5, p. |
| Capital Traction Co., Wash., D.C. | 2c. | April 18, p. |
| Memphis Street Railway | 3c. | May 10, p. |
| Des Moines City Railway | 5c | May 24, p. |
| Springfield, Massachusetts Street Railway, Worcester | 10c. | June 14, p. |
| Cleveland Railway | 12c. | June 7, p. |
| Manchester & Nashua St. Ry. | 7c for one-man cars | July 5, p. |
| Manchester & Derry Street Ry. | 5c. for two-man cars | |
| Trenton & Mercer Co. Trac. Co. | 10% | Aug. 19, p. |
| Arkansas Valley Interurban Ry. | — 3c. | Aug. 30, p. |
| Peoria Railway—Trainmen only | — 7c. | Sept. 20, p. |
| Scranton Railway | 1c. | Oct. 4, p. |
| Boston Elevated Railway | 2½c. | Oct. 18, p. |

* Hourly rate increased to 48c.; increase itself not known.

(1) Cut by company sustained.
(2) Set aside by court as excessive and reduced 10 cents.
(3) Men asked increase.
(4) Company asked reduction

# P. R. T. to Operate 225 Gas-Electric Buses

**New Design Departs Materially from Previous Gas-Electric Drives — Entire Control Is by Throttle of Gasoline Engine Which Drives Generator—Motors Are Permanently Connected Direct to the Generator and Power Is Transmitted to Wheels by Bevel Gears—Elimination of Differential Is Expected to Lower Maintenance Costs**





**At Left, Chassis of Experimental Gas-Electric Bus, Showing Power Plant and Individual Motor Drive for Each Rear Wheel Eliminating Differential. At Right, the Gas-Electric Bus Is in General Appearance Similar to the Standard Yellow Coach Gasoline Bus**

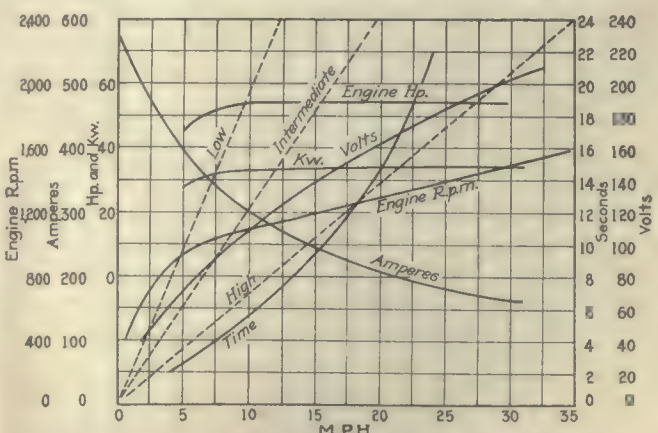
AFTER a series of exhaustive tests, the Philadelphia Rural Transit Company, a subsidiary of the Philadelphia Rapid Transit Company, has ordered 225 gas-electric buses which will differ in several important respects from earlier designs. The placing of the order was mentioned briefly in this paper, issue of Dec. 6. Engines, chassis, and bodies will be built by the Yellow Coach Manufacturing Company, while the electrical equipment will be supplied by the General Electric Company. Mitten Management has ordered 25 additional buses for use in Buffalo. The total cost will be about $3,000,000.

Power will be supplied by a standard six-cylinder engine of 4¼-in. bore and 5½-in. stroke, rated at 108 hp. at 2,200 r.p.m. This engine will drive a generator permanently connected electrically to two 20-hp. electric motors mounted side by side on the chassis frame. These in turn will be mechanically connected to the rear wheels by drive shafts and bevel gears.

The speed of the bus will be controlled by movement of the throttle of the gasoline engine. Clutch, transmission, and mechanical differential have been eliminated. Because of that and also because of the constant torque of the electric motors, the wear and tear on all moving parts, as well as the chassis and body, is expected to be much reduced, insuring a greater length of life for all equipment.

The generator, known as the GE-1098, is compound wound with a differential series field, the shunt winding being excited by a small generator which forms a part of the main generating unit. The exciter obtains its field current from a 12-volt storage battery. This arrangement of windings provides high current and low voltage at starting. Due to the inherent characteristics of the generator, as the vehicle accelerates the voltage increases and the current decreases automatically until normal running speed is reached. For a given throttle opening the output of the generator is substantially constant under all road conditions. In this manner the necessary torque for acceleration or hill climbing is provided without overloading the engine, and with a smooth change of speed. The generator is designed to transmit the output of the gas engine within practical limits of operation. The bus is designed for a normal maximum speed of 26 m.p.h. on a level roadway.

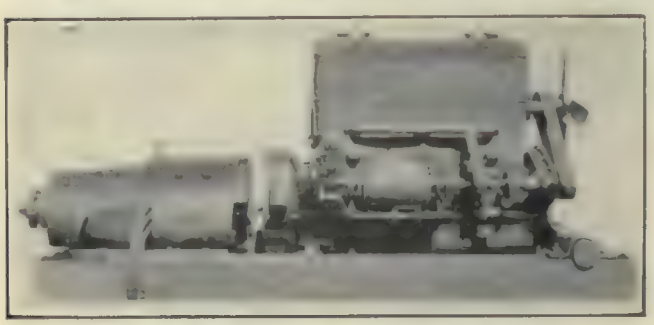
Both the generator and the motors, which are known as GE-1079, are designed on the basis of 125-volt operation, and are self-ventilated. The motor frames are long and of small diameter, permitting assembly on the chassis without sacrifice of road clearance.




**Acceleration Curves of the Philadelphia Gas-Electric Bus. The Corresponding Speed Curves for the Gas-Mechanical Bus Are Given in Dotted Lines**

Acceleration and all speed changes are obtained solely by variation of the engine throttle, which is controlled by the usual accelerator pedal. As the engine speed increases, the generator voltage rises. The operator need not remove his hands from the steering wheel except to apply the emergency brake. There is no electrical controller for the motors, nor are any electrical adjustments made by the driver when running the bus. A small switch is provided having an off position and reverse for backing. This is connected with a single hand lever to the left of the steering post.

Before this design was definitely selected, competitive tests were run with the experimental gas-electric bus and a bus having the usual gear drive, with clutch, transmission and differential. The accompanying illustrations show the chassis and exterior appearance of this experimental bus. Several minor changes in design will be made when the new buses are built. The gas-



Power Plant of the Gas-Electric Bus Includes a Variable Voltage Generator and a Separate Exciter Driven from the Engine Shaft

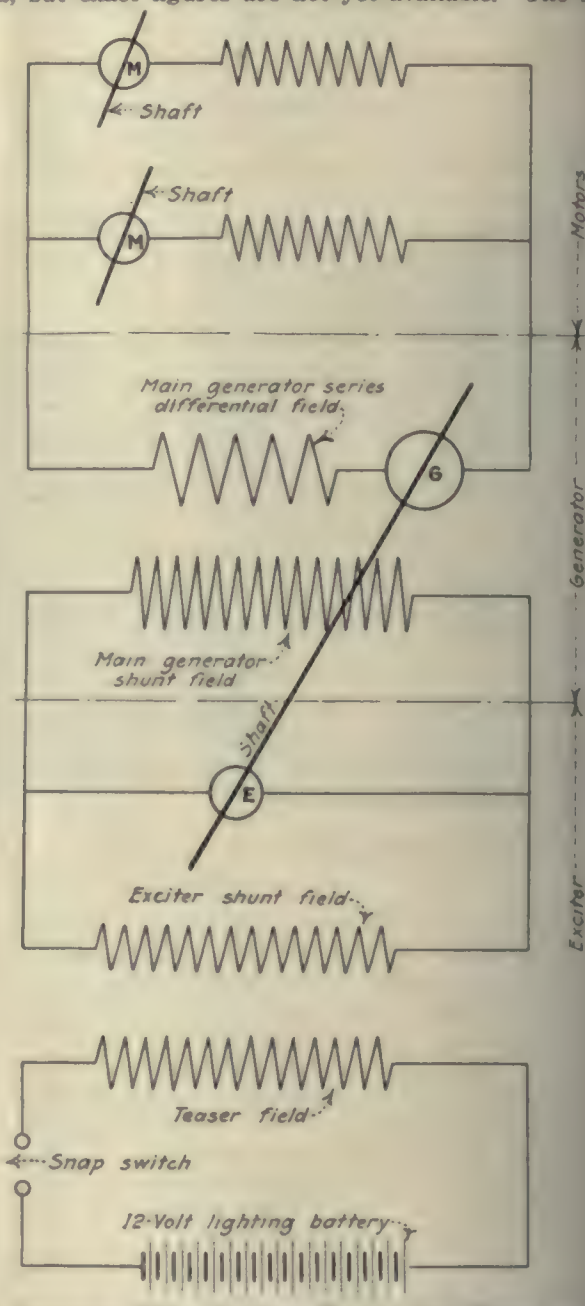
electric bus has been in regular service from Aug. 1 up to the present time and has covered more than 13,000 miles.

It is said that the tests made show somewhat lower fuel consumption for the gas-electric bus for a given service, and at the same time a higher rate of acceleration and schedule speeds. These are important factors in city bus operation. An important point which was developed was the fact that the engine of the gas-electric bus actually makes 20 per cent fewer revolutions when running under city conditions than does the engine of the bus equipped with mechanical drive. This is because with gas-electric transmission it is impossible for the driver to race the engine, and it is also difficult for him to stall it.

The great advantage claimed for the new design, however, is its simplicity. There is comparatively little electric wiring and no controller. The various parts are easily got at for inspection and repair. Elimination of more than 2,000 movements of the gear shift per bus per day is expected to reduce maintenance costs and prolong the life of the chassis and body. Moreover, the electric drive is silent and the customary noise and jerk of changing gears at the time of starting will be absent.

The two-motor drive permits a better distribution of power to the rear wheels when going around a curve. In the event of the failure of one motor, the bus can be brought back to the garage on the one remaining motor. The fact that the bus cannot be put in gear when going down hill is not considered a drawback because there are no steep grades on the routes where the buses will be operated.

The buses are of the double-deck type and have a seating capacity of 66. The weight of the completely equipped gas electric bus will probably be several hundred pounds greater than that of a mechanical drive bus, but exact figures are not yet available. The first




Schematic Wiring Diagram, Showing How Motors Are Permanently Connected to the Generator

of the buses will be operated on the Broad Street route for which a franchise was recently obtained. Additional routes, however, have been planned.

## Purchasing Agents Aid Traffic Survey

AT A TIME when the time-table division of the Department of Street Railways, City of Detroit, was having trouble to keep pace with lay-offs at the factories, it occurred to the management to seek the aid of the purchasing agent. It was thought that as a member of the Purchasing Agents' Association of Detroit, the latter could readily get in touch with some 500 fellow agents in local manufacturing plants. This was in fact accomplished through the courtesy of the executive secretary of the association, who devoted most of the space in a circular letter to a statement on "Improving Your Street Railway Service."

He pointed out that the railway is a business operated for profit. A shortage of cars hurts traffic. A surplus of cars means excessive operating expense. The problem is to keep the service adjusted to variations in demand. In view of these facts he requested the members to fill out and mail to him prepared postcards giving information concerning the number of men employed. It was particularly requested that large employers refrain from over-statement because the theory of securing "plenty of cars for every one" soon defeats its own purpose. It is one thing to say that a thousand men are employed and another to find that these men are on a three-day week and that only 500 are on the job at one time.

Replies received to this card covered some 200 plants employing from 300,000 to 400,000 men. During the two or three weeks following many facts of value to the traffic division came to the purchasing agent.

# The Readers' Forum

## *Best Results in Energy Saving Made with Instruments*

ECONOMY ELECTRIC DEVICES COMPANY
CHICAGO, ILL., Nov. 26, 1924.

To the Editors:

I have read with interest the abstract, on page 776 in the Nov. 1 issue, of the paper read by Wilhelm Pforr, manager Berlin Street Railways, before the International Electric Railway Association meeting at Homburg von der Höhe.

A hurried examination of this abstract would indicate that the author's findings were contrary to practices very widely adopted in the United States; but a more careful reading shows that Mr. Pforr's conclusions are based on his personal experience and are more or less contrary to the answers received to the questionnaire which he circulated with a view to summarizing opinions on the results obtained from all forms of energy-checking devices.

It is certain that the experiences of users of energy-checking devices in North America do not confirm Mr. Pforr's conclusions. Mr. Pforr finds that 30 per cent of the properties addressed were using instruments of some sort. In the United States approximately 25 per cent of the active motor cars are equipped with watt-hour meters and a substantial number are equipped with coasting time recorders or power-on time recorders. A large mass of data is therefore available in this country on which to base answers to the four points set forth by Mr. Pforr, who argues that it is better for his property and some others of similar size to encourage the saving of car propulsion energy by having additional power supervisors rather than by the joint use of energy-checking devices and power supervisors. He summarizes his objections as follows: (1) The appreciable expense of record-keeping personnel; (2) the maintenance cost of the instruments; (3) overloads occur oftener because the instruments tend to encourage high rates of acceleration and to discourage the series running, which is so valuable in congested areas; (4) false comparisons, which are drawn frequently, cause dissatisfaction among the motormen.

Our statements which follow are based on findings obtained over a period of 12 years use of Sangamo-Economy mercury type watt-hour meters with and without car inspection dials:

1. The average expense for clerical record keeping is less than $10 per meter year and this expense is made up largely of the accurate determination of all revenue car mileage. The results therefore are of value to the property in addition to simply that of checking the energy consumption. On some properties it has been found that a large part of this $10 was already being spent in obtaining car mileage.

2. The average expense for thoroughly maintaining—that is, cleaning and recalibrating—Economy watt-hour meters is less than $2 per meter per year, and the average cost for repair parts is less than 10 cents per meter per year.

3. Regarding the encouragement of high rates of acceleration and retardation through the use of a so-called "power-saving" device, the discussion of this point borders on competitive arguments between the devices which check a man through the use of the time element or by actual measurement of the energy. We argue that under the latter plan the watt-hour meter encourages rather than discourages series running and proper feeding of the controller in accordance with car and street traffic conditions. It does not put a premium on accelerating rates higher than those for which the electrical equipment of the car was originally designed.

I believe that the widespread experience in the United States has shown that not only with watt-hour meters but also with time-checking devices, the peaks at the substation bus are actually decreased. On one large property that made a special study of this, the 24-hour energy saving indicated through the use of meters at an average of 14 per cent, was accompanied by a reduction in the rush-hour peak of a little less than 10 per cent.

4. Under the system of rating the relative operating efficiencies of motormen through the use of the kilowatt-hour per car-mile, the meter does most of the engineering, and the question of false comparisions between men is hardly possible of justification when the usual operating constants are applied to the situation. With the kilowatt-hour as a unit the man is judged by what he does to avoid unnecessary losses and is measured by the actual expense he entails in the energy cost for operating his car.

We believe firmly in personal instruction, as Mr. Pforr recommends; but we have found that the best results cannot be obtained without the use of some checking device whereby a constant measure may be had on each motorman showing whether he is or is not following the instructions given. We have found that even where intensive instruction has been given, the use of the Economy watt-hour meter has increased the efficiency of operation from 10 to 20 per cent.

To summarize: Experience in this country, where more than 200 roads are using watt-hour meters as car energy checking devices, has shown that substantial savings result over and above those that can be obtained by the use of any number of instructors. This saving is far in excess of the overhead and operating costs. In fact, numerous roads have wiped off all operating and capital charges for the meters with the savings obtained during the first year.

L. E. GOULD.

# Association News & Discussions

## Public Utility Problems Discussed in Pennsylvania

### Relief from Paving Burdens, Quantity Production of Renewal Parts, Bus Operation, and Relations with Other Utilities Were Subjects at the Twentieth Annual Convention of the Pennsylvania Street Railway Association

DEPARTING somewhat from custom, the Pennsylvania Street Railway Association invited representatives of various municipalities to be present with the electric railway men of the state at their twentieth annual meeting at the Penn-Harris Hotel, Harrisburg, on Dec. 5. A lively interest in the proceedings was manifested by a number of the city officials who took part in the discussion which followed the presentation of papers.

An outstanding feature of the meeting was a paper on relief from paving burdens by A. T. Davison, general counsel Third Avenue Railway, New York City. An abstract appears elsewhere in this issue. In discussing Mr. Davison's paper, D. L. Starr, a member of the Traction Conference Board of Pennsylvania, urged a more complete presentation of facts to the public. He said that many points in Mr. Davison's paper were new to him and that he believed greater efforts should be made to give such information to the public. William LaFountaine, Director of Public Works, Scranton, Pa., said that the question of relief from paving burdens deserves careful consideration. The compromise suggested by Mr. Davison, whereby the city would construct the original paving between the tracks and the railway would maintain it, might be effected, he thought. The secretary of the Pennsylvania Chamber of Commerce said that the subject was one of great importance, and he would be glad to have all the available facts for presentation to the chamber.

Speaking of the relation of electric railways to other public utilities, P. H. Lantz, financial assistant to the president Philadelphia Company, Pittsburgh, said that in common with the other utilities the railways possess a huge investment and a relatively large number of employees coming in constant contact with the public. Their influence is tremendous in engendering and maintaining a friendly regard for their companies. The first step toward a better understanding of the motives of the railways and a better comprehension of their problems can well be taken by approaching those engaged in other public service occupations. They offer the distinct advantage of a sympathetic audience.

When new methods affecting customers are introduced, when schedules or routes are changed, when the rates are increased, nearly all human beings experience the same feeling. There is a natural disposition to criticise a change, and if not to resent it at least to question it. How does it sound, Mr. Lantz asked, to the man in the street, to hear an electric light man say that he "wonders what those fellows are up to now," when a street car schedule is changed? Or if a railway man is quite upset at the prospect of an advance in gas rates, it creates a bad impression. To some extent, people regard all those engaged in public utility service as pretty much in one class. They are supposed to have common characteristics. If those engaged in these services, therefore, are to be classed together, they should realize the advantages of standing together. In conclusion, Mr. Lantz told of the success which had attended the presentation of several short skits written with a view to showing the public some of the problems encountered by utility companies.

After mentioning the good results which were being obtained through the sale of securities to customers, Major J. S. S. Richardson, chairman of the Pennsylvania Public Service Information Committee, gave some good suggestions concerning publicity methods. He said that railway men should avoid the use of the phrase "educating the public." The public believes that it already is sufficiently educated and is not anxious for any more education handed out by the railway companies. In his opinion, the use of the phrase "informing the public" would avoid this difficulty.

Traffic problems were briefly discussed by Police Lieutenant Marshall, in charge of the traffic department in Pittsburgh. In his opinion, it is not feasible entirely to eliminate automobile parking. This, he considers, would interfere too greatly with the conduct of business. In Pittsburgh, by the establishment of a commercial unloading zone in the center of the block, it has been possible to prevent vehicles loading and unloading merchandise from standing alongside automobiles already parked and thus completely blocking the street.

A somewhat different point of view was expressed by C. F. Crane, assistant to the president Harrisburg Railways, who said that in Harrisburg the problem of traffic congestion is almo altogether a question of automobi parking. He thought that it was matter of all or none, and that automobile parking in downtow streets should be eliminated, just as railway passes were eliminated som years ago when this abuse had grow intolerable. In the same way, the t tal elimination of parking wou remedy the situation without discrin inating against individuals.

The morning session was opened b an address from F. R. Phillips, pres dent of the association. After dwellin briefly on the scope of the industry Pennsylvania, he said: "There ha been some who, because of the aut mobile and the bus, have felt that t electric railway has practically reache the limit of its usefulness. But whe we consider that, in the year of t greatest expansion of the automobi and bus, the electric railways of th state increased their usefulness at t same or even at a greater rate tha before, this should controvert any ide that they are going backward."

Mr. Phillips spoke also of the wo of the various committees. The com mittee on legislative matters repr sented the interest of the associatio in hearings before the State Tax Com mission. The committee on constitu tion and by-laws submitted a repo clarifying certain portions of the co stitution and by-laws. A committee o the joint use of poles was organize at the suggestion of the chief of th bureau of engineering of the Publ Service Commission. The enthusias with which the committees have a tacked their work has removed an doubt, Mr. Phillips said, as to the po sibilities which exist for the associ tion to be of real service to its mem bers.

Reports were read by the secretar and treasurer and committees wer appointed. A recommendation of th committee on constitution and by-law suggesting that only one meeting year be held instead of two, and tha some minor changes be made in th matter of the dues, was approved. F M. Stine, secretary of the associatio warned of the difficulties that may en sue as a result of the attempt of th Pennsylvania Giant Power Survey t link together companies that are we situated geographically for this pur pose but not equally well situated eco nomically.

Commencing his remarks with th observation that maintenance is lik the poor—with us always—Harry E Meyer, development and supply divi sion, Westinghouse Electric & Manu facturing Company, presented a pape on the advantage of buying renewa parts from the manufacturer most in terested in their performance.

abstract of this paper will appear future issue.

s operations of the United Electric ays of Baltimore were outlined . H. Palmer, vice-president and al manager. He gave it as his on that buses are now a necessity hat their future utility lies in fur- ng feeder and connecting line ce. The possibilities of de luxe ce he considers problematical. ial service and chartered buses be a source of revenue to the ting company. Mr. Palmer spoke e satisfactory results which have obtained in Baltimore with in- d double-deck buses. In conclu- he emphasized the impossibility ses handling mass transportation, hich connection the fact that the fare must be higher than the rail- fare is an important considera- tending to limit the field of use- ss of the bus.

telegram was received from La- St. Clair, American Electric Rail- Association, who was to have en on the subject "How Best to Street Car Rides to Automobile ers." The telegram summarized ly the tenor of the remarks which St. Clair would have made, as ws: "Make comfort of street car g rather than cost of running an mobile the basis of appeal to auto- ile owners. They resent being told they cannot afford to run cars, the e as they resent being told they ot afford fur coats for their wives. k to the comfort text. Say it briefly often, and you will sell rides."

he meeting ended with a banquet, which a number of prominent men ennsylvania spoke. Major Richard- added to his remarks made earlier he day and stressed particularly fact that information given out by railways to the press must have news value or it will not be pub- ed. As an example of the way that time element affects news value, told of a number of sensational ies that were running on the front es of the newspapers in the sum- of 1914 and how they were dropped rnight when Austria declared war Serbia and Russia mobilized 14 y corps on the Austrian border.

ohn L. Stewart, member Pennsyl- ia Public Service Commission, spoke fly concerning the efforts of the com- sion to promote at the same time the rests of the utility companies and the public. A few reminiscences of early days of the street railway ustry were related by P. G. Wells, uty attorney-general of Pennsyl- ia. The financial condition of the te was outlined in an address by ditor-General Samuel Lewis. Mrs. C. Hughes, assistant to the vice-presi- t of the Pennsylvania Section of the tional Safety Council, spoke on the ject of safety. The concluding aker was former Lieut.-Gov. E. E. idleman, who emphasized the need for re business sense in the conduct of ry-day affairs.

The officers re-elected for the com- year included F. R. Phillips, presi- nt; W. F. Bell, vice-president, and nry M. Stine, secretary and treas- r. On the executive committee F. R. illips, W. F. Bell, C. L. S. Tingley, Thomas Cooper and C. F. Crane were re-elected. New members of the executive committee will be H. L. Mitchell, West Penn Railways; J. L. Adams, Philadelphia & Western Railway; W. A. Woolford, General Electric Company, and Joseph Wayne, York Railways.

# Let the City Pave and the Railway Maintain the Pavement*

BY A. T. DAVISON
General Counsel Third Avenue Railway, New York City

IT WOULD be a waste of time to point out to street railway representatives the gross injustice of the archaic paving burdens under which the railways of the entire country, except in a few enlightened states, are literally staggering. The real question before us is, "What are we going to do about it."

At the outset, we should all realize that the real source from which our relief must come is public opinion. That is the strongest influence in the life of any community, state or nation. No legislature or set of officials can, in the final analysis, act counter to public opinion. Once we can convince the public of the gross injustice of this burden and of how vitally it is affected by it the relief will follow as a matter of course.

First, then, as to the form of relief which we should ask for. The best way to drive out a bad idea is to put a good idea in its place, and similarly, the best way to get rid of this iniquitous paving burden is to substitute for it a plan which is so fair and reasonable that no one can possibly object to it.

I believe that we cannot convince, at this time, a majority of the people that we should be relieved of all paving burdens. It may come in time, but it will only come after we have obtained a modification of the present drastic obligation.

Coming, then, to the specific form of relief which we should now ask for: The obligation on street railways to do any original paving should unquestionably be entirely eliminated. The justice and fairness of this is self-evident. It has been judicially recognized that street railway companies derive no special or peculiar benefit from the construction of the paving, and, as stated by the Street Railway Investigation Commission of Connecticut:

"The trolley car can run satisfactorily and give service to its patrons regardless of whether a street is paved or not."

Obviously, the only purpose of paving the railway area is to make it more convenient for purposes of travel by vehicles other than street cars.

The only reason ever advanced why street railways should do any paving has been that the operation of their cars caused a deterioration of the pavement. This might be an argument for an obligation to maintain a pavement after it has been laid, but certainly is no justification for requiring the street railway company to pay for the original pavement. The obligation to do original paving cannot be justified on any theory.

The idea, then, to instill into the minds of the public is this: that street railway companies should be required to restore to its former condition so much of the pavement of the street as shall have become in need of repair in consequence of the existence and use of their track.

The absolute fairness of such an obligation becomes the more apparent the more it is considered. It means that regardless of any specified railway area, if by any chance the companies because of the existence and use of their tracks in the streets, cause damage to the pavement anywhere between the curbs, they are to pay for that damage. Nothing could be fairer than this.

It may be that in numerous instances this form of relief will be given voluntarily by the municipalities, but it is important to bear in mind that in all the states of the Union this form of relief can be given by appropriate laws passed by the legislatures. There is no legal obstacle in the way of altering present paving obligations notwithstanding that such paving obligations are embodied in the franchise contracts themselves. The United States Supreme Court has upheld the authority of the state to alter the obligations contained in franchises granted by municipalities and accepted by street railroad companies, notwithstanding the argument that these franchise obligations were in the nature of contracts between the municipalities and the street railway companies.

Our approach to the public should be along the lines that the street car riders are the ones who are in reality bearing this paving burden, either directly by way of increased fares or indirectly by being deprived of service which otherwise they would have. We ought to make the people see that street railway corporations do not and cannot, under our regulatory and public service commission laws, use the streets for private profit. All moneys paid by street railways for paving obligations must be charged to operating expenses and paid out of the fares collected. Therefore, if the operating expenses of street railways must include paving obligations, the public is required to pay just that much more on its rate of fare.

Furthermore, we ought to tell the public how many passengers we are carrying on our lines each year and show them that if those persons were not carried on street cars they would necessarily be carried in other vehicles which would use the streets in greatly increased numbers and thus increase

*Abstract of a paper presented at the convention of the Pennsylvania Street Railway Association, Harrisburg, Pa., Dec. 5.

the wear on and deterioration of the pavement.

Also, we should show that the tracks in the street are an asset to every community. These tracks are a guarantee to every business man and to prospective buyers of property that there is a permanent method of transportation in that locality, whereas if these tracks were removed and some other form of vehicular transportation were substituted, there is no guarantee that such other means of transportation will continue on that street. The street railways should explain how much of their income is paid to defray these paving obligations, and then compare these amounts with the taxes paid by other public utility corporations. We should also show that the amounts paid by street railway companies for paving do not render to the riders, who in reality pay these amounts, any more service than to the general public. Those who are really benefiting are the automobile users. We should make the car riders realize that they are paying the paving burden of the automobilist whose car they have just dodged at a street intersection or whose car is blocking their progress at the peak hour in congested territory.

We should show the public, and particularly the legislature, how absolutely fair the remedy we are asking for is, namely, that we should be required to restore to its former condition so much of the pavement as shall have become in need of repair in consequence of the existence and use of the track. In this connection, we should explain that if there is any damage caused by the weight of modern electric cars or vibration or flattened wheels or defective rolling stock, then the more that damage is, the more the company would be required to pay.

Furthermore, the obligation to maintain the pavement meets any claim that it is weakened at the points just adjacent to the tracks by reason of the lines of cleavage existing at such points, thus allowing considerable surface water to percolate through into the sub-surface and weaken the foundation of the roadbed. The remedy we propose fully meets this condition. The plan places a penalty on poor track construction and a premium on good track construction. Wherever we remove the pavement for track repairs we, of course, would be required to restore the pavement to its former condition.

And then, too, we should tell the public that in eleven states and one province in Canada a paving obligation has been adopted substantially in the form which we are now asking. In three of these states, Massachusetts, Rhode Island and Connecticut, the relief is statutory and state-wide. In the other eight states, Wisconsin, Washington, Kentucky, Indiana, California, Michigan, Illinois and Minnesota, and in the Province of Quebec, Canada, this form of relief has been adopted by one or more cities.

In the city of New York the Transit Commission has provided that the rate of fare on one of the lines in an outlying section shall be increased one cent for every $100,000 of paving which the company is required to pay. As a result, the paving program in that section has been very materially altered by the city authorities.

Of course the most important class of persons to be convinced are the members of the legislature. This, however, will follow of its own accord when public opinion has been sufficiently awakened. But until that time we should should improve all opportunities of getting information directly to the members of the legislature. One method of doing this and also of getting the matter before the public is to introduce in the legislature each year a bill which will give the relief which w asking for. The introduction of bill should be followed by hearings at all these hearings we have de strated in New York City that the reason why relief has been withh the desire of the city authorities to and collect from street railways a share of the municipal paving exp even though it be iniquitous, unjus an imposition on the car riders. only emphasizes the point that p opinion must be so molded that arbitrary retention of an unfair bu can be ended.

# Operating Experience with Buses*

## Various Sources of Trouble Are Pointed Out—Better Brakes, Provi for Overloads, Six-Cylinder Engines for Smoother Starting, Mor Dependable Tires, Larger Capacity Generators and High Maintenance Standards Needed

By B. Hilburn
General Manager Tulsa Street Railway, Tulsa, Okla.

PERHAPS there is no more interesting subject relating to the transportation industry today than that of co-ordinating bus and street car service. The announcement in the October issue of *Bus Transportation* that 155 electric railways of the United States and Canada are operating 1,914 buses over 2,405 miles of route is conclusive evidence of the growing use of the bus by electric railway operators. It is also significant that more railways are operating buses in city service than in any other field.

Upon the advent of the unsightly jitney, without any semblance of regulation or responsibility, many of us unfortunately followed the practice of the ostrich and proceeded to cover our heads, in an attempt to ward off the danger of the approaching destructive competition. With our heads buried in the sand, we were unable to observe the rapid strides being made in the development of automotive equipment.

Before we realized it, many outsiders had begun to take advantage of the insistent demand for the newer mode of transportation. Where we have failed to supply this demand others have done it. It matters not that operation of the motor bus in city transportation has in most cases proved unprofitable; there are always those who are willing to take a chance. It is almost certain that ultimately a type of equipment will be designed that will prove practicable, and as operators get more experience many of the present operating problems will be solved. Therefore, it is absolutely essential that electric railways adopt the motor bus and proceed to find its place in the scheme of transportation. If this is not done there is grave danger of the business passing into other and more progressive hands.

Like many other street railways throughout the country, our city became infested with the "jitney" in 1914. The operation of this unsightly vehicle in competition with our lines has continued down to this day. There have been many attempts to eliminate them, but without any degree of success. have had, and now have, a city ministration that is willing to elim them, but the state laws have been that any ordinance passed with end in view has always been voide the courts.

In 1922, in an effort to eliminat jitneys from the streets, the city p an ordinance requiring all auto b or automobiles being used in t portation service, to be of not less 16-passenger seating capacity. was done upon our agreement to ate motor buses on some of the where jitneys were operating and reached territory not served by lines. For the most part, the ji were covering routes that cam direct competition with the street We purchased 15 Garford buses and White Model 50. Six of the Gar buses were of 16-passenger cap and the other nine Garfords, and White had a seating capacity fo passengers.

We operated the buses on two ro One was 2.7 miles long. An e minute headway was maint throughout the day, with suffi extra buses to give a 6-minute head in the peak hours. On the other r which was 2.5 miles long, we m tained a 6-minute headway throug the day and added additional buse give a 3½-minute headway in the hours. The operating results satisfactory, until the jitney opera after about three months, went court and succeeded in having the dinance voided. Then they went onto the line with their buses. the Supreme Court finally affirmed decision of the lower court, we drew our buses and placed them route which was just half way bet the jitney line and the street car However, this operation was unpr able, and at the present time we only operating buses as short ex sions of two car lines. We are at p ent directing our efforts toward se ing a new franchise, which, if the grants, we think will take care of jitney situation. Then we will prob be required to place in operation m

*Abstract of paper presented before meeting of Midwest Electric Railway Association, St. Louis, Nov. 24, 25, 1924.

to supplement our street car ce.

ere seems to be no need to discuss roposition as to whether buses are g to be used, because, in my opin- that question is already settled. e electric railway doesn't operate some other agency will. It s that losses are going to be in- d and that the electric railways going to have to carry the burden, the bus manufacturers do their rimenting and development. But ll be much better for the railways et in on the ground floor than to ther agencies get the start, which d mean that the electric railways d suffer more than from the losses red during the development stage. erefore, it is apparent that we ld put our shoulder to the wheel exert our efforts toward solving problems that are connected with peration of the motor bus. And Lord only knows, they are many. n the things I have read and things that I have heard I have ed the impression that there are operators of intercity or inter- n buses who are making money. ever, I have addressed letters of ry to many operators of buses in transportation and have failed to one who is actually making money hem. It is, I think, a favorable acteristic that most of them are nistic. I may say that I have not ded in my list the large inde- ent operators, such as the Fifth ue Coach Company or the Chicago r Coach Company.

e of the most serious problems ronting the bus operator is the ing problem. While, no doubt, the motive engineers have within the year given this problem more con- ation than in the past, I do not ve they yet realize the vast dif- ice in the strain on the brakes on us compared with that on the or- ry service truck. The continued ing and stopping to take on and arge passengers necessitates the f the brakes many hundred times per day than on a truck. And, if rapid schedules are to be main- d the use of the brake must be more severe. I mean by that, the ator must run at a fast rate of l up to the point where he is to and then stop quickly. Some od of giving more braking surface be developed, and material more ble than that now in use must be d. It is not the exception, but the ral rule, that brakes in perfect ition when a bus goes out on its will in a very short time be in such ition as to make the bus unsafe peration. Much of this could be n care of by proper adjustment isions. When you are in the mar- for bus equipment, it will be wise you to investigate thoroughly the ing apparatus.

ght along with the braking prob- I want to touch on the load capac- rovisions. There has been no more us mistake made by the bus manu- rers than that of underestimating load capacity requirements. In instances they have placed on the sis a body which seats the entire ber of passengers which the chassis is capable of carrying. It may be that under certain conditions loads can be limited to the seating capacity. It is most definite and certain that we cannot do that in our city, and I think the same condition holds true in most places. When you take into consideration the fact that more than 50 per cent of the traffic is handled in the peak hours, say from 6:30 to 8:30 in the morning, and from 4:30 to 6:30 in the afternoon, it can readily be seen that the equipment must carry overloads. If we should attempt to place in service sufficient additional equipment to provide seats for everybody in the rush hours, then the equipment could not possibly earn sufficient at current rates of fare to pay the operating expenses, because of the light traffic in the off-peak hours. So the bus manufacturers must so design their equipment that it will carry the overloads, just as the street cars have always done. And that is another thing you should go into carefully when purchasing bus equipment.

The constant starting and stopping of buses in city service is, perhaps, the cause of most of the mechanical troubles that occur. Therefore, automotive engineers should strive to achieve the utmost in flexibility of the driving mechanism of the equipment. I have discussed this feature with many of the engineers in the industry. It is my theory that a six-cylinder motor is preferable to the four-cylinder motor, in that it will afford a greater degree of smoothness in starting. We have never had much trouble with our motors, even though they have been greatly overloaded. But we have had much trouble from the clutch back to the rear end. It is my opinion that most all of this is due to rough starting. I have not always had the engineers agree with me that a six-cylinder motor would afford any relief. However, I note that some of them are now coming out with that type of motor. It will be exceedingly interesting to see how it works out. It may be that some sort of hydraulic clutch could be worked out to give greater flexibility.

When a bus gets so it does not start smoothly, and all buses will get that way as they grow older, then the process of battering at the transmission, universal joints and finally and probably most seriously the rear, or differential gears, begins. These shocks soon have an effect on hubs and wheel bearings.

Tires are also a serious matter. There is no doubt of the desirability of pneumatic tires from a resiliency standpoint. They are more comfortable to ride on and they are less destructive to the equipment. However, from the standpoint of regularity of service and dependability of service they are not so satisfactory. A flat tire is certain to lay the bus out for a trip, and this causes an interruption of the schedule. I think that in time a satisfactory type of solid cushion tire will be developed that will make the use of the pneumatic unnecessary, and when it is, that will do away with a lot of trouble.

Another important item is the electric generator. The current necessary to light up the interior agreeably, and at the same time keep the outside lights going, has proved such a drain on the batteries and generators on our equipment that they could not carry the load. That, no doubt, is being taken care of, but don't overlook that feature in your specifications. And let me remind you that while the manufacturers of bus equipment are earnestly striving to overcome all the difficulties, they are less familiar with transportation requirements than you are. They have for several years been engaged in the manufacture of equipment for use in other lines of business, in which the requirements cannot be compared with those of passenger transportation.

It seems entirely out of place to suggest to a body of street railway men the necessity for rigid inspection of equipment. Yet our experience has taught us that the maintenance problems of buses are so much greater than those of street cars that it has been difficult for our maintenance department to inspect frequently and thoroughly enough. There are so many more working parts in a motor bus, and so many more adjustments that the average mechanic is prone to release his job before all final adjustments are made. The work does not stand up, as does the mechanical work done on the street car. We have found that our bus maintenance requires much attention. Greatest effort should be made to keep complete harmony between the shopmen and the operators on the road. Friction between these two groups can cause much trouble.

## C.E.R.A. Annual Meeting Jan. 8 and 9

THE annual meeting of the Central Electric Railway Association will be held Jan. 8 and 9, 1925, at the Miami Hotel, Dayton, Ohio. Following a meeting of the executive committee at 9 a.m. the sessions will be opened by the presidential address of Harry Reid, president of the association and president Interstate Public Service Company, Indianapolis.

After the presidential address, A. E. Magee, president Ohio Association for Prevention of Grade Crossing and Highway Accidents, will present a paper, "Elimination of Grade Crossing and Highway Accidents." The discussion on this paper will be led by Wallace Muir, Charles L. Henry and J. B. Dugan.

The report of a special committee appointed to review recommendations of state committees on elimination of grade crossing and highway accidents will be presented and followed by a general discussion.

In the afternoon the delegates will visit the McCook experimental flying field of the United States government.

The annual dinner will be held at 6:30 p.m. at the hotel.

The Friday session, which will be called to order at 9:30 a.m., will be devoted to the subject "Super-Power and the Railways," by E. H. Sniffin, manager power department Westinghouse Electric & Manufacturing Company. Following the discussion there will be an election of officers, and immediately after adjournment the new executive committee will meet

# Spheres of Motor and Railway Transport Discussed at New England Conference

## Use of Buses and Trucks to Handle Traffic Formerly Carried at a Loss Described—Some Bus-Mile Costs Questioned—Co-ordination of All Transportation Agencies Urged

TO DEFINE better the fields of service of the steam railroad, the electric railway, the motor truck and the motor bus, a conference under the auspices of the National Automobile Chamber of Commerce was held at Boston, Mass., on Monday and Tuesday of this week. About 300 transportation men and public officials attended, among the speakers being a number of prominent electric railway executives.

At the opening session Frederic S. Snyder of Boston presided, and the first speaker was Alfred H. Swayne, president General Motors Corporation, who discussed "The Relation of Highway Transport to Other Transportation Facilities." He pointed out that New England is demanding better transportation facilities and at lower cost. Either the railroads, the electric railways and the existing independents will develop motor routes to meet present and future needs or outside groups will come in and build up a profitable business by giving this service. Road conditions in Massachusetts, Rhode Island and Connecticut are unusually well adapted to motor transport, which is largely confined to manufactured products of high value. More than two-thirds of the total motor truck movement is in distances of from 1 to 30 miles. Motor vehicle transport should be subject to the regulation of rates and service given other carriers. In taxation, the common carrier motor vehicle should be granted no favors which give it an undue advantage over the other agencies. The best interests of the public and the rail, waterway and motor interests lie in co-operation between them rather than in wasteful competition, and the greatest opportunity for co-operation is in the terminal areas of great cities.

C. L. Bardo, general manager of the New York, New Haven & Hartford Railroad, read a paper picturing the magnitude of the railroad industry in this country, the investment involved and the necessity of co-ordinating transportation by highway and rail to eliminate wasteful competition. He stated that the New Haven road stands ready to co-operate in the co-ordination of agencies for the better distribution of local traffic from the rail heads —particularly in the industrial centers and cities.

### ELECTRIC RAILWAYS AND HIGHWAY TRANSPORT

A masterly résumé of the development of the electric railway and its economic place in modern life was presented by L. S. Storrs, president of the Connecticut Company, New Haven, Conn. An abstract of this paper is printed elsewhere in this issue.

"Independent Highway Transport" was discussed by James M. Swift of Boston, president Interstate Limited Motor Coach Company and counsel for the Motor Coach Association of New England. Mr. Swift outlined the demand of the public for bus transportation, declaring that it has come to stay, as it fills a new place in transport service.

A warm discussion of the place of the motor bus in New England occupied an afternoon session under the chairmanship of A. J. Brosseau, president Mack Trucks, Inc.

R. H. Newcomb, assistant to the vice-president New York, New Haven & Hartford Railroad, said that all steam railroad employees realize that the motor coach is here to stay. The railroads have consistently advocated the reduction of economically unsound competition and the real problem is one of co-ordination. It is unfair, said the speaker, that the bus should have no regulation whatever in Massachusetts, when the steam and electric roads have it. All forms of transportation should have the same general regulation. Taxation should also be levied on motor buses on a fair basis.

R. M. Sparks, vice-president Interstate Limited Motor Coach Company, sketched the development of highway transport up to the present day of bus application. He affirmed his belief in the special service rendered by the motor coach to the public and vigorously declared that this service will be maintained and expanded as fast as the traffic demands.

H. F. Fritch, Boston & Maine Railroad, said that his company is studying its unprofitable branch mileage with the possibility of doing away with train service and substituting the motor vehicle. The private automobile is a primary factor in the lack of patronage on these branches. He commended the firm stand of the electric railways of the country in 1919-1920 against the jitney, which led to success in the battle against these invaders. It is no proof, the speaker declared, that the bus is economically sound because the public patronizes it in particular localities. When equitable tax adjustments are made in relation to the motor bus, the allurements of this new form of transportation will diminish somewhat. A broad study of the entire passenger and freight carrying problem is essential to a solution of the motor bus situation.

A. R. Williams, counsel of the United Electric Railways, Providence, R. I., maintained that the field traversed by the motor bus is already served by steam or street railways. If these two agencies cannot afford to lose to the motor bus they will have to go out of business where the bus has taken the patronage. If the public has reached the period of non-regulation of any such transport agency as the motor bus, Sovietism once removed has arrived. It is impossible for the rail carrier economically to handle mass transportation unless it also handl the middle-of-the-day business. If t public really demands the privilege riding on rubber the service shou be properly regulated and rendered existing carriers. The speaker charg that a motor bus line has taken on third of the income of the New Hav road between Providence and F River.

Mr. Sparks said that New Engla is from 3 to 5 years behind the tim in motor coach service. George Gariepy, Pawtucket (R. I.) Chamber Commerce, bemoaned the increased co of bus and trolley riding. In reply an inquiry, Mr. Sparks said that motor coach company proposes to velop the Providence-Fall River tra to the utmost and to handle it the ye round. T. H. Benton, of the Springfie Mass., city transportation board, s that the city authorities approve gra ing the existing transport agencies fullest opportunity to develop the for of service required by the public bef turning over such rights to others.

Clark V. Wood, president Springfi Street Railway, pointed out his willi ness to supply any form of service ceptable to the public and for which latter will pay a reasonable price. F A. Cummings, assistant to the cha man of the board of trustees, East Massachusetts Street Railway, agre that the motor coach has come to s and said that his company is willi to operate any bus line so long as yields 6 per cent on the investment provides the required service. Bus eration will be put on wherever proves more economical, but the co pany will not parallel a bus line wh the latter is not under regulation.

H. B. Freeman, receiver Hartford Springfield Street Railway, pointed that buses on that road have sup seded electric cars and are giving improved service. The running ti is now but 1 hour 20 minutes betwe the terminal cities against a form time of 2 hours 15 minutes by troll De luxe buses are operated on a fare $1 each way. A new class of traffic being developed, including business m formerly driving private automobi over the route and women who frained from boarding trolley cars the center of the highways because traffic density.

Mr. Freeman pointed out that substitution of motor buses on Asylum Avenue line in Hartford by Connecticut Company has apparen reduced street congestion, partly a result of the stopping of the buses the curb. George E. Pellissier, Holy Street Railway, emphasized the need more studies of costs, bearing in mi however, that cost alone does not dicate the public's willingness to for a service. P. G. Carleton, coun Eastern Massachusetts Street Railw contended that the Massachusetts should require independent buses secure licenses from the Departm of Public Utilities, as is required electric railways before the latter operate motor vehicles.

Mr. Williams pointed out that m communities would be in a seri transportation plight if the elec railways should take up certain lo trackage, install bus service and t

ie bus service inadequate. One say how permanent the motor ll be, at this time.

closing the session, Chairman au said that a large majority of tor vehicle manufacturers favor te regulation of buses.

ard Dana, general manager Elevated Railway, presented ening paper on Tuesday morning motor bus session on "The nics of Motor Bus Operation." uthor recounted the development tor bus service on the Boston and gave some significant data financial aspects of motor bus on sparsely patronized trolley here the handling of mass tran- on is not a feature of the day's An abstract of Mr. Dana's s is published elsewhere in this paper.

J. Flickinger, assistant to the nt the Connecticut Company, Haven, read a paper on the de- ent and experience of his com- n the motor bus field. This is cted elsewhere in this issue.

. Wood, Springfield, Mass., said ie motor bus has been "sold" to blic and that the electric rail- have been appointed the col- , but some question exists as to illingness of the public to pay t of such service in addition to cars. H. W. Johnston of the England Motor Tours Company, ton, Mass., said that his oper- cost per mile, including taxes charges, is from 23 to 26 cents. figures were vigorously ques- by several speakers, the con- of opinion being that the cost or bus operation would run well his amount in average practice. Sparks, Boston, supported the of costs presented by Mr. John- Mr. Dana again urged his s to beware of motor vehicle e cost statistics, on account of mense range of conditions en- red. There is no more hazy t in the electric railway field, l, than undigested data on costs ehicle or car-mile. Mr. Flick- concurred, and after the state- that taxes and return on the ment were not included, said that gh approximate cost per motor- -mile of the Connecticut Com- bus service is about 28 cents. Dean, Commerce Motor Truck ny, cited a cost per mile on one for single-deck buses of 31 and 38 to 39 cents for double- s. He cautioned his audience take "fly-by-night" estimates as robable operation costs.

A. Cummings of the Eastern chusetts Street Railway said o competition exists between his ny and the Boston Elevated y over the Park Square-Arling- eights bus route toward Lowell Eastern Massachusetts, as no raffic is handled. It was main- that little or no competition between the electric railway bus in the eastern New England t and the steam railroad service. an for uniting automobile motor and bus owners under the banner American Automobile Associa- as discussed by Ernest N. Smith, general manager of the A.A.A. Under the plan of organization two new departments will be created, a truck department and a motor bus department, with the necessary trained personnel. There will be no effort to compete with existing state organizations of truck and bus owners, but efforts will be directed toward co-operation with such organizations with a view toward solving national problems which continue to be a stumbling block to the freer use of commercial vehicles. There is at present considerable variation in truck tonnage laws, handicapping truck freight seriously in many quarters. Smoothing out matters of this sort will be among the many aims of the truck division of the A.A.A.

In its activities along legislative lines the new division will function through representation in the Motor Vehicle Conference Committee. At present the bus and truck owners of the country are not entitled to representation and cannot function in co-ordination with the committee because they are not represented by a national organization.

### Resolutions Sum Up Meeting

Resolutions were adopted by the conference looking toward co-operation of rail, motor and water carriers rather than unregulated and wasteful competition. Other resolutions indorsed regulation of motor vehicle common carriers similar to that for other utilities, the requirement of certificates of public convenience and necessity and the requirement of adequate liability insurance.

It was resolved that taxes should consist of (a) state motor vehicle taxes, the proceeds of which should apply to highway maintenance; (b) taxes in exchange for franchise rights, providing an amount equivalent to that paid under the preceding item be deducted.

Uniform common carrier regulatory statutes throughout New England, and uniform regulation of highway traffic were recommended. Enabling legislation was recommended to permit steam railroads, trolleys and other public utilities to acquire, own and operate motor vehicles.

It was the sense of the conference that to promote co-operation of the various parties and co-ordinate railroad and truck service, a permanent committee should be created to be known as the New England Transportation Council. This should consist of equal representation from each of the several agencies represented in the conference, together with representatives of the general public.

The traffic program of the conference was summed up as follows:

*Resolved:* That it is the sense of the session that the approach to the problem of traffic congestion should be broadened to comprehend all the agencies contributing to or affected by transport traffic; that the traffic policy should develop the basic physical plan of the city; encourage higher efficiency and organization in traffic and transport operation and administration; that all large traffic centers should promptly organize for thorough study of their complete traffic-transport plan, in a manner best suited to the community, to the end that a broad co-operative effort of all groups of our city population may be secured to provide for both present relief and future needs.

# Railway Operation of Buses in Connecticut*

## Increasing Traffic Has Necessitated the Use of Larger Vehicles, but the Bus Has Been Found Unsuited for Mass Transportation— Maintenance Methods Are Described

By W. J. Flickinger
Assistant to the President the Connecticut Company

With the policy of the state in regard to bus operation clearly defined, the management of this company was in a position to take advantage of the bus as an auxiliary. The first bus route was established in July, 1921, additional routes having been added, until at the present time we operate 15 bus routes in New Haven, Hartford, Stamford, Bridgeport, Westport, Waterbury, Meriden and New Britain. These are divided into three classes:

1. Extensions into unserved territory which had developed some distance from the rail facilities.

2. Replacement of trolley service on routes where the revenue was low and which were faced with the necessity of making large expenditures for track and overhead rehabilitation.

3. Between terminals where the highway offers a shorter route than the rail line which was built along a circuitous route to serve the greatest amount of intervening territory.

There is one other instance where it was necessary for passengers to travel from the north to the south part of the city over the main business street and numerous requests were made for an alternate route to avoid delays incident to the heavy traffic on the main street. This would have necessitated the construction of track at a cost of at least $125,000. A bus line about one-half mile in length, connecting with the rail lines, has satisfactorily met this situation at a much lower cost.

In the first two classes the rate of fare on the bus is the same as on the trolley, with free interchange of transfers. In the third class, the expedited service by the bus is recognized by a slightly higher rate.

Our original bus equipment included 3 27-Passenger Packards, 2 21-passenger Whites, 2 18-passenger Whites, 1 Duplex, 1 Mack and 19 Reo Speed

*Abstract of a paper presented at the New England Motor Transport Conference, Boston, Mass., Dec. 9.

Wagons, all on truck chassis with cheaply constructed bodies. By that time the motor truck industry and the body manufacturers became actively engaged in developing equipment which would be more suitable for the transportation of passengers than the truck and the lightly constructed, inconvenient and uncomfortable body. The first buses of improved type were purchased in November, 1921, to which new equipment has been added from time to time as required until at the present time we own 4 Pierce-Arrows, 2 Fageols, 8 Yellow Coaches, 2 Macks and 2 Whites with a seating capacity of 29, 10 Macks, 13 Whites and 5 Republics with a seating capacity of 25, 2 Whites with a seating capacity of 21, 1 White and 2 Brockways with a seating capacity of 18, 1 Duplex with a seating capacity of 20 and 8 Reos with a seating capacity of from 12 to 14, a total of 60 buses. This equipment, together with garage facilities, represents an investment of approximately $500,000.

At the close of 1922 we were operating 79,000 bus-miles per month; at the close of 1923, 92,000 bus-miles per month, and at the present time we are operating 134,000 bus-miles per month, an increase of nearly 70 per cent over 1922.

With the increase in traffic, we have found it necessary to discontinue nearly all of our 12 to 14-seat buses, substituting buses of larger capacity. We have also discontinued from passenger service all but three of the original buses which were on truck chassis. This investment was not, however, a total loss as we had for several years been working on a budget to motorize the line department, and the completion of this budget was made possible by converting this equipment into tower and signal maintenance trucks, in which service they will have some further years of usefulness. The amount which it was necessary to charge against bus equipment, therefore, was more a matter of obsolescence than depreciation.

In an industrial community such as we serve there is a very heavy peak load demand, which adds materially to the cost of the service because of the necessity for stand-by equipment. Under the law in Connecticut the maximum number of passengers allowed on a 25-passenger bus is 27 and on a 29-passenger bus 31, which makes the ratio between bus and trolley on the basis of carrying capacity 1 to 3. As an illustration of how this works in actual practice, we have one route serving a highly developed industrial community on which the traffic demands are such as to require 2 buses for 18 hours, 3 buses for 12 hours, 4 buses for 4 hours and 9 buses for one hour, so that we have 5 buses which operate only one hour out of 18, carrying only a one-way load; 1 which operates only 4 hours and one 12 hours, the 7 part-time buses operating only a total of 21 bus-hours per day. In the same city it requires 40 trolley cars to operate the base schedule, while during the peak-load period of about 2 hours 90 cars are required. Due to the lighter traffic in the off-peak hours, it would probably require a very few more buses than trolley cars to handle the traffic, but during the peak-load period of 2 hours it would require three times as many buses as trolley cars, or about 370 buses. This would result in an investment in over 200 buses for rush-hour service as against 50 trolley cars.

Going a little further and taking a concrete example, there is one industry located on the outskirts of the city at which 1,150 employees finish their day's work at the same time in the afternoon. These men are carried to the city in 14 trolley cars. To perform this same service would require 40 buses. I offer this as food for thought to any who may have conceived the idea that the time is not far away when buses will be the sole means of mass transportation, as it must be recognized, of course, that the transportation agency is under obligation to meet the full transportation requirements at all hours of the day and under all conditions.

I believe it is necessary to study the traffic situation very carefully on individual routes, as where the number of passengers on a bus at any one time is limited an increase in the size of the bus may produce a very desirable effect on the net revenue. I have one case in mind where the substitution of 29-passenger buses for 25-passenger increased the net several cents per bus-mile because additional business was there and all that was needed was the increased capacity for handling it without a corresponding increase in the bus mileage. There was practically no difference in the operating cost between the 25 and 29-passenger vehicles.

When we commenced to operate buses we felt that complete cost records would be necessary to guide us in making decisions from time to time, particularly as we were inexperienced and would have to watch results very carefully. Accordingly, we immediately established a classification of accounts along lines similar to those used in our railway accounting and gave detailed instructions as to the distribution of expenses to all of our employees having anything to do with bus operation. We have a detailed record of the maintenance and operating cost, gasoline and oil mileage of each individual bus, also the mileage of each individual tire. Having found the speedometer unreliable for the purpose of computing bus mileage, we have equipped each bus with a hubodometer, and the odometer readings are, from time to time, checked against the route mileage, to see that the odometers are in proper working order. As all of our costs are analyzed on a bus-mile basis, it is very important that we get the mileage as nearly accurate as possible. A failure to credit a bus with all mileage operated would give it an unfair disadvantage in making comparisons.

Each driver is provided with a card on which any defect developing is noted. The card is turned in with the bus at the end of the run and the defect is taken care of before the bus again goes on the road. In so far as possible, buses are assigned to the drivers. By this method, a driver is more careful in handling his bus and will give it a great many small attentions owing to his personal interest in it.

The scheduling and operation under the supervision of the same ordinate official who has charge of trolley operation, although where conditions require it street supervisors assigned to bus operation exclusive By this method the bus and trol schedules are more readily co-ordina to make a unified transportation tem. I might say, incidentally, t between Dec. 1, 1923, and March 1924, out of 37,700 scheduled bus-hou our buses lost, due to mechanical t bles or bad road conditions, a total only 92 hours.

The bus maintenance organizati so far as the chassis is concerned, entirely separate from the organizat which maintains the trolley cars. believe this to be essential as the work requires an entirely different of experience. The bodies, howe are practically the same as our t ley car bodies and they are maintai by the regular car shop organizati

We have a central garage in N Haven, which not only takes care of maintenance of the New Haven bu but also has an overhauling shop wh the buses from the entire system taken for general overhauling, bodies, however, being removed overhauled in the local shop while chassis is being overhauled in the c tral garage. The work on both usually completed at about the s time and when the chassis goes b to its division the body is placed o and it is then ready to return to s ice. So far, this arrangement se to be working satisfactorily.

It is our practice thoroughly to spect each bus every 7 days, at wh time it is thoroughly greased and crank case oil changed if necess We change the crank case oil ev 1,500 miles.

While we have adopted no defi general overhauling schedule, we that after a bus has operated betw 50,000 and 60,000 miles it is to advantage to take it down and re all worn parts. In this connection depend very largely on the judgm of our foreman as to the necessity general overhauling as he is fa familiar with the physical condit of each unit.

One item of expense which we h had to adopt more or less blindly that of depreciation. We origin adopted the straight line depreciat basis over a period of three ye With the improvement in the type equipment and the discovery that buses would average from 35,000 40,000 miles per annum, we felt t our charge was too high, as with c ful maintenance and periodical o haul we felt we should get at l 200,000 miles per bus. Most ma facturers with whom I have discus the matter claim that a greater m age can be expected. We prefer however, to be conservative and th fore adopted the mileage basis of de ciation on a life of 200,000 miles. experience shows us that we will a greater life, it will, of course, a pleasure to change our depreciat basis.

It seems to me that the experie gained, not only in Connecticut but nearly all of the other states wh

operation has for the past few rs been a live issue, leads to the lowing conclusions:

. That the bus is an established nsportation facility, useful as an iliary to existing rail transportation serving new territory where there not sufficient revenue in sight to rrant the investment necessary to struct rail facilities, or to substi- e for trolleys where rail facilities no longer be maintained except h the expenditure of money out of proportion to the earning capacity.

. To permit competition between forms of public transportation is economic waste.

3. In territory where there is a chartered transportation agency, such agency, by reason of the training of its officers and employees, is equipped to meet best all of the transportation requirements and the people will receive at the hands of that agency a regular and dependable service.

4. Whether it be a street railway company operating rail cars or buses, or a legally established bus company, it is only by protection from competition and regulation by the constituted state authority that the investment in these enterprises can be safeguarded and the public receive the best transportation service at reasonable rates.

# Economics of Motor Bus Operation*

## On the Boston Elevated System Motor Buses Have Been Used Advantageously to Solve Difficult Situations—Over-enthusiasm Warned Against

By Edward Dana
General Manager Boston Elevated Railway

OU have heard it said that the transportation of a modern city is essarily a monopoly. I think the rd in unfortunate, for it is a monop- only in the same sense that our department, our police department water department are necessary nopolies. Nevertheless, this is a l-established basic fact and because its soundness there came into exist- e the regulating bodies clothed with authority to insure fair treatment the agency rendering transportation well as to prevent those agencies ctising upon those it served the ls of unregulated monopoly.

am referring to these facts ad- edly before attempting specifically to e up the motor bus itself because if advocates of the motor bus are ler the impression that this vehicle change this basic principle they ocate a destructive transportation ncy, and like most destructive agen- they usually contain the seeds of ir own destruction within them- ves.

Many motor bus advocates really ieved that it would be possible to counter to the basic principles ich had been developed during the t quarter of a century in this coun- . They put lines in operation and them only when the greatest oppor- ity to get traffic existed. With such load factor, the elements were in stence to assure a low fare and y gave low fares and usurped the eet railway business and at the same e created new business.

Let us examine this condition and ply it under our basic principles. street railway system functions for entire area served. It has to main- n a readiness to serve over the en- e district and cars are operated 18 20 hours a day, 365 days a year, gardless of the amount of traffic, for good of the district as a whole. r instance, the Boston Elevated car- s 1,100,000 passengers on a week and runs 161,000 car-miles. On a nday it carries only 600,000 but runs 108,000 car-miles. The receipts on Sunday are 14 cents per car-mile less than on weekdays. That is what I mean by readiness to serve.

Suppose, for instance, that the street railway was not affected by the basic principles I have referred to, but instead functioned according to the underlying principle which is characterized by the jitney line I referred to, what would result? Some lines would have a low fare of 5 cents and other lines would have a fare of possibly 25 cents if they were to have any service at all.

Now let us turn to the constructive aspect of the motor bus. The economics of the motor bus comes down to the management of a new tool to do work which has been done in some instances with an improper tool and to do work for which we were not equipped with any tool before.

The motor bus, it would seem, has established its place as a part of a unified transportation system. It has its proper place, just as does a one-man car or a two-man car or a multiple-unit train. In 1923, 95 railways operated 925 buses. I understand today 168 railways operate 2,633 or more buses. Progressive railway officials apparently see that in the motor bus there exists a very useful ally to the electrically operated units. A combination of facilities is therefore afforded which can give the traveling public the service which can best serve its needs.

The story of the motor bus as it has unfolded in the territory served by the Boston Elevated Railway may be of interest generally.

Under the 1918 act, the Elevated was required to be operated on a service-at-cost basis and fares were increased. On July 10, 1919, a flat 10-cent fare had been reached. This flat fare was accompanied by a substantial decrease in revenue passengers, even though the fare was sufficient to prevent deficits and cover the full cost of service.

Naturally, there has been some discussion and advocacy of competitive buses, but the assessment against the taxpayers of $3,980,151.67 for the first year's deficit under public operation and the fact that this amount had to be repaid before fares could be decreased had a very real effect upon those in authority by whose action motor buses could be permitted.

The consequences of the act were understood by most municipal officers, and it was realized that if competitive motor buses were permitted and the revenue of this great system diminished one of three things must occur under the laws:

1. An increase in fare above 10 cents to offset the loss, or

2. Additional deficits against the taxpayers, or

3. Loss of service in the district affected, in an effort by the state trustees to localize the competition and place no burden upon the system as a whole which might result in a higher fare or a tax assessment.

The result was that the cities and towns refused licenses to competitive jitneys with a single exception, where the city later revoked the competitive jitney license.

The Boston Elevated Railway began the operation of motor buses on Feb. 24, 1922, between Union Square, Brighton, and the Boston-Watertown line on North Beacon Street. Bus service has increased from that time and we are now operating bus lines requiring for regular schedules 46 buses and for extra service a total of 66 buses. During the month of October we operated 97,680 bus-miles and carried 676,005 passengers in buses.

As an instance of the use of this new ally on the Boston Elevated Railway the so-called Cottage Farm line may be cited. This line was 2.219 miles long, operated through narrow streets and served 3,600 people in both directions daily. The rebuilding of the Cottage Farm Bridge was up for consideration. Following established custom the car rider was to be assessed approximately $60,000 of the cost. The rebuilding of the tracks over which the line operated would cost $180,000. The 8 cars on the line represented a capital outlay for both car and power plant capacity of approximately $200,000. To serve 3,600 people by cars a plant investment was called for of $440,000. The plant investment if buses were to be substituted would not exceed $100,000, a fixed charge saving of no inconsiderable proportion.

Referring again to the use of a tool, why use a sledgehammer if a tack-hammer will get results? Or in railway vernacular, why put the Twentieth Century on the Skowhegan branch?

But let not the pendulum swing on the strength of such a performance and bus enthusiasts rush in where angels fear to tread and proclaim its ability to supplant, replace and relegate to the Dark Ages the mass transportation agency—the street railway—than which no more economical agency exists today to perform its task. Ridiculous and absurb. We might as well urge that a Ford was all that is necessary in the form of an automobile, so why have so many other makes.

I referred to the hope of new territory in the use of the motor vehicle. The Boston Elevated has several lines of this very character where no previous trolley service existed but where

*Abstract of a paper before the New land Motor Transport Conference, Bos- Mass., Dec. 9, 1924.

today the district is served as an integral part of the Elevated system.

There is still another use, the ultimate development of which by street railways has not been appreciated, and that is chartered bus service. Street railway service of this sort was limited by the proximity of the terminal points of the trip to car lines. The bus removes this limitation and permits the street railway to utilize its personnel and its equipment when not otherwise engaged, except for the very peak hour.

Summarized, therefore, the bus in some instances can replace trolley lines; in others, reach out into new territory, and in a third way become a business getter in the way of special parties.

As regards the vehicle itself, its mechanical efficiency and its appointments for the service to be rendered opens up a fascinating field for a multitude of detailed discussion. Suffice it to say that I have unlimited confidence in the enthusiasm and the ability of the motor vehicle builders to co-operate, study and improve almost from day to day this agency once the underlying basic principles of its regulation, control and field have been definitely indicated.

But there is one thought which comes to my mind in this connection, and that is that over the doors of most Roman villas there usually was an inscription, *Cave Canum*, which, translated, means "Beware of the dog," and I offer for the consideration of the bus men an inscription over the door of the electric railway, "Beware of bus-mile statistics."

# Providing Complete Transportation Service*

## There Are Many Uses of the Bus in Connection with the Electric Railway and the Two Should Be Used Together Where Best Suited

By L. S. STORRS
President the Connecticut Company,
New Haven, Conn.

ONE often hears the statement that the electric railways are in a transition period. To a certain extent this is true, but this utility has constantly undergone change. From the days of the horse car, one modification after another has been adopted in the effort to keep ahead of the reasonable requirements of the communities.

In an effort to supply necessary public service and in order that full transportation facilities may be offered, railways are rapidly adopting the motor bus as an auxiliary. At the present time there are at least 3,000 motor buses operated by electric railways in the United States, 300 of which are in New England.

The task confronting the transportation utility is not that of providing regular service to the people of the cities during the 18 to 24 hours of the day, for that would only mean running cars over the tracks on even schedules, a relatively simple matter. The real job of this servant of the people is providing sufficient service to take care of their needs in going to work in the morning and returning home in the afternoon.

This mass transportation period is but four hours in duration, or at the most four and one-half hours, during which approximately one-half of the total daily passengers must be taken care of. That is, of the 44,000,000 passengers per day in the United States, at least 20,000,000 must be transported in 4 hours, or at the rate of 5,000,000 per hour.

This mass movement is the real problem, and one that large-capacity cars, or trains, running along the streets of our cities or through subways or upon elevated structures in the metropolitan areas, alone can cope with. The requirement for added facilities to take care of this mass movement in the growing American cities is ever confronting the transportation executives.

We are so familiar with the inconvenience in travel, during the peak hours, in street cars or subway, that the common impulse is to complain of the service or criticise the management when as a fact the most efficient service is being rendered. Either the subway facility is taxed way beyond the capacity which it was expected to care for when planned; or the number of street cars, operated through streets already congested to the point of saturation, will not permit any further addition. But try to visualize the results with bus operation. I have in mind one of the bus routes in Connecticut on which the travel requires the following service:

For 18 hours, two buses; for 12 hours, three buses; for 4 hours, four buses, and for 1 hour, nine buses. So we have five buses which operate only 1 hour out of 18 carrying a one-way load; one which operates only 4 hours and one 12 hours, the seven part-time buses operating only a total of 21 hours per day. This is mass transportation with a vengeance—and it is a nice question as to whether rail transportation to serve this route would not be more efficient and economical.

The great growth of American cities has been made possible solely through a thoroughly efficient and dependable system of transportation. Dependable service, not only that of today, but throughout the days to come, cannot be obtained unless supplied by a responsible organization depending upon its patronage for its own financial success. If the service is rendered by groups of individuals jointly, or by each in his own interest there can be no assurance of continued service. It will depend upon the personal whims or ability to carry on, and that solely during periods of prosperous operation.

In any city there are lean areas from the transportation standpoint through which dependable service is as much of a necessity as it is in the district that make possible profitable operations. Complete service through all portions of a city is needed for the growth of the city.

The development of the motor bus has placed in the control of the electric railways a very efficient aid in providing improved service in the cities and surrounding districts. The greater flexibility of a transportation unit which is not confined to fixed routes makes it possible to extend service into areas that have been developed since the electric railway trackage was constructed, and, by co-ordinating this service with street railway service, give a more adequate facility to the community.

It must be apparent that the need for a well-planned system of transportation within any community must include all types of service that the present stage of the art has developed; that each type of service must be utilized in that particular work which it is best designed to perform; that both types must be placed under the same obligations and restrictions and that both must be under the identical regulatory body in order that the ultimate end of a perfect transportation system may be attained.

By far the best results are possible when both types of service are operated under the control of one transportation organization with the obligation to make the most efficient use of each. Only under such a policy can a thoroughly co-ordinated service be produced and the maximum benefit obtained.

A great deal has been said of the probable substitution of the motor bus for the electric cars, but it is apparent that the bus is not capable of efficiently serving mass transportation in the large cities. It is equally apparent that there are many uses to which this unit can be put in providing essential service, and the electric railways must be prepared to adopt the motor bus as an integral part of their plant, and by adopting a broad view of their obligations abandon the idea of being merely electric railways and take on their real function, that of being the agents of the public in supplying all of the transportation requirements of the communities.

The time has come for the use of the bus by the experts. It can be made to be of great service, but its full utility cannot be determined until serious efforts have been made thoroughly to co-ordinate the two types of service. This new facility is as yet too recent a development for anyone to predict with any degree of certainty the particular instances of its actual value in the general transportation needs of any city. The efforts that have thus far been made to co-ordinate the bus service with existing trolley service are of too recent date to have more than pointed the way to possible other uses.

Without question the first obligation of the railway is to fill the unserved

*Abstract of a paper read at the New England Motor Transport Conference, Boston, Mass., Dec. 9, 1924.

areas, after which there is the gradual opportunity to economize by substitution of the motor bus for electric cars in thin traffic areas, when confronted with excessive track reconstruction expenditures. There are opportunities to develop new business by a combination of the above two bus operations. The possession of a sufficient fleet of bus units will develop the incentive to find new uses for these units. While it is unlikely that there will ever be a large amount of supersession of the street cars by the bus in city areas of dense riding, experience in the actual cost of bus operation as compared with the cost of operation and upkeep of electric railway plants will serve as a guide to direct the gradual expansion of bus operations.

There is a field for the development of a higher grade of service than that possible in mass transportation, or what has come to be termed de luxe service, at rates considerably higher than traction fares, as well as high grade special service along non-served routes, such as that performed by the Fifth Avenue Coach Company, at slightly higher rates. These are all matters that the transportation experts should determine, but it is certain that they will be determined by someone.

It has been said that the good will of the community is the greatest single asset of a public utility and no steps can possibly be taken that will be productive of so large a measure of this good will as the adoption by the railway of the bus and the active development of such service necessities as exist within the various communities.

There is one phase of the matter that warrants serious consideration, the result upon the securities of the electric railway, provided there is any large amount of substitution. The superseded physical property has a definite value which is represented by issues of stock or bonds. It will be necessary to permit the new service to earn a net in excess of the allowed "fair return" sufficient to amortize the physical value so superseded over a term of years. This is but one of the problems that will be presented during the period of readjustment.

The experience of electric railway companies in New England with bus operation has encouraged some of us to believe that we shall be operating many more buses in the near future. At the same time, we have no reason to believe that the bus will supersede the electric railway in its most important function—the carrying of the millions of persons to and from work during the rush hours of the day.

# New Englanders Discuss Maintenance and Employee Relations

SO MUCH interest was aroused in the subject of rolling stock maintenance at the November meeting of the New England Street Railway Club that at the meeting on Dec. 4 another paper was presented on this topic by L. S. Day, Westinghouse Electric & Manufacturing Company, Boston, Mass. President T. H. Kendrigan occupied the chair. Mr. Day's paper will be published next week.

In opening the discussion President Kendrigan pointed out that a sleet storm is hardest on railway motors and that where snow is dry much less difficulty is encountered in maintaining service. Mr. Day admitted the influence of weather effect on motors, but declared if the insulation of motor coils is well varnished and if the snow-fighting equipment is in good shape, much less trouble will occur than where poorer maintenance holds sway. Good maintenance implies that field coils are properly dipped and baked, that insulation is "live," motors are tight and that the roads are open. It is a pity to diminish service during storms for on these occasions many opportunities arise to carry patrons who ordinarily use private automobiles.

W. C. Bolt, Eastern Massachusetts Street Railway, Boston, said that he is studying the problem of when to replace old with new equipment and Mr. Day stated that he is making a similar investigation.

John Lindall, Boston Elevated Railway, concurred in the value of systematic inspection and overhauling, but declared that local service conditions are often controlling. In the same city a single storm will sometimes tie up the cars on one division and leave those on another free from interrupted service. Poor track is responsible for a multitude of car failures, and after track is relaid it often happens that the pull-ins in a district begin to diminish after a few months' service over the new rails. "Two years ago," said Mr. Lindall, "we had 300 motors that gave us a good deal of trouble and I recommended their replacement but could get only money enough to replace 100. We took out the worst motors and put the new ones into the hardest service. This step has reduced maintenance costs on these 75 cars so much that I question whether I could now make out a case for replacing the other 200 motors."

Mr. Bolt emphasized the generally good condition of tracks on the Eastern Massachusetts system as a factor in lowered car repairs. Special attention has been given to drainage to prevent water accumulating on the tracks. Nothing is more damaging to a motor than salt water. Passenger car equipment is not built for snow fighting, and an adequate snow-fighting equipment is important as a factor in relation to car maintenance. In a typical storm eight to twelve motors were burned out on one car line in 2 or 3 hours where the snow had not been properly removed, and yet there were no motor failures on the rest of the system where similar cars were operating.

F. B. Walker, chief engineer of maintenance Eastern Massachusetts system, pointed out the importance of keeping up the voltage in reducing car pull-ins from motor burnouts. Of 180,000 joints on the system about 125,000 have been replaced and many bonds test 100 per cent in conductivity. "We credit our department," said he, "with about $100,000 in motor repair savings as a result of joint and bond maintenance." R. D. Hood, Haverhill, Mass., said that much good has been effected by the use of negative feeders. In hard winds it is the practice on the Massachusetts Northeastern to put up the voltage to 650 and fewer motor failures result.

Following the usual dinner, S. F. Fannon, director division of public service, Sherman Service, Inc., Boston, addressed the club on "A New Conception of the Job," and Prof. T. N. Carver of the department of economics, Harvard University, gave a talk on "Economic Tendencies." Mr. Fannon's paper appears elsewhere in this issue.

Professor Carver depicted the causes of many modern economic wastes and emphasized the trend toward their reduction resulting from the diffusion of wealth, employee and customer ownership. He predicted further advances in the cost of labor in this country, but drew the conclusion that as relations improve and as the investing class increases in numbers many present causes of conflict will disappear.

## Kentucky Association Meets Jan. 15-16

THE annual meeting of the Kentucky Association of Public Utilities will meet at the Seelbach Hotel, Louisville, on Jan. 15 and 16. There will be a get-together dinner for members on the night of Jan. 15, with an all-day business conference on Jan. 16.

# American Association News

## Special Reports Available

THE following special reports have been prepared by the Bureau of Information and Service and are available to member companies in good standing upon request:

*Motor Bus Operations in the United States.*—List of motor bus lines showing name and address of the operators and where the information is available, statistical data on the character of their operations. Part I, motor bus lines in Arizona, Colorado, Connecticut, Delaware (Wilmington), Indiana, District of Columbia, Maine, Maryland, Michigan, New Hampshire, North Dakota, Rhode Island, Utah, Vermont, Wisconsin, Wyoming.

*Accident Statistics of Electric Railways for* 1923.—Analysis and summary of the statistical data on accidents reported by more than 150 companies on association questionnaire. The information covers the number of accidents, ratio of cost to gross earnings and comparison of accident records on unit bases, all of which is also compared with the record for the year 1922. A summary of safety work carried on by electric railways is also included.

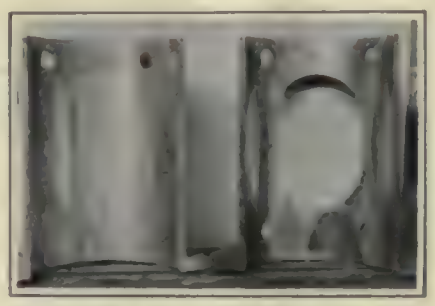
In addition to the above, supplements to the Wage Bulletin, Fare Bulletin and Cost of Living Studies have been prepared, bringing them up to date.

# Maintenance of Equipment

## Utilizing Worn Axle Brasses

OBTAINING double life out of split axle brasses by replacing the worn top half of the lining with the bottom half is accomplished in the Wheaton shops of the Chicago, Aurora & Elgin Railroad. Finding that an excess supply of lower halves of axle lining were accumulating, an investigation was made to see if they could not be used for some other purpose. By filling in the bearing window with babbitt, and building up the flange by welding, it was possible to utilize the bottom half as a top half. The accompanying illustration shows a babbitt lined split bearing before and after closing the window with babbitt.

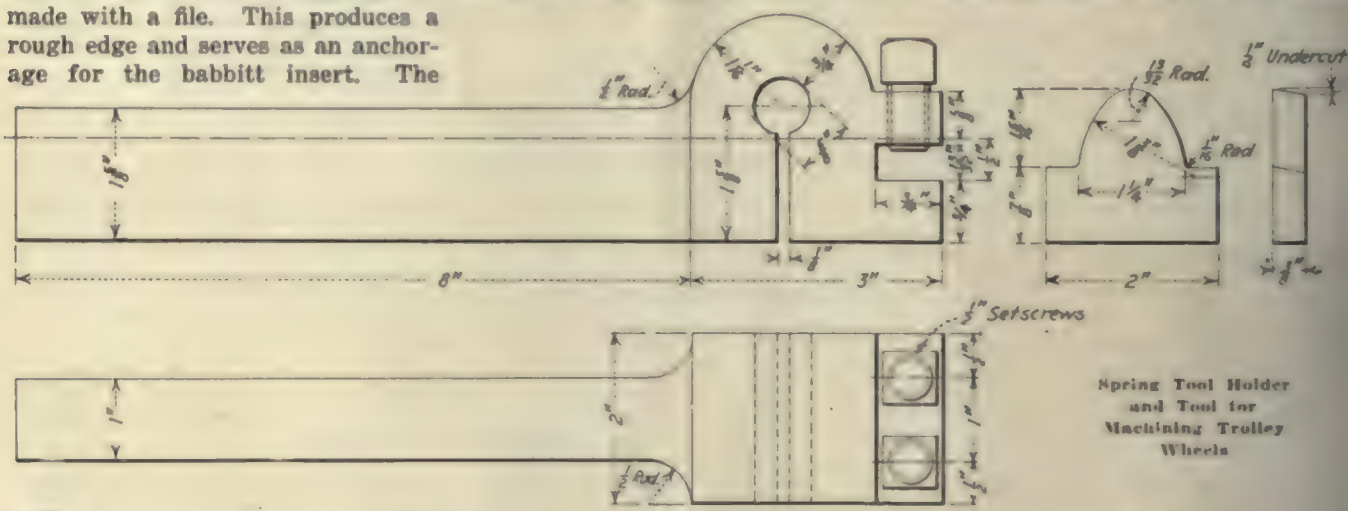
The edges of the window are serrated by means of indentations made with a file. This produces a rough edge and serves as an anchorage for the babbitt insert. The bearing is then placed around a mandrel and the window poured full of babbitt. It is machined inside and out, and is suitable for use as an upper half of an axle bearing. This practice has resulted in the use of material which heretofore had been considered scrap.



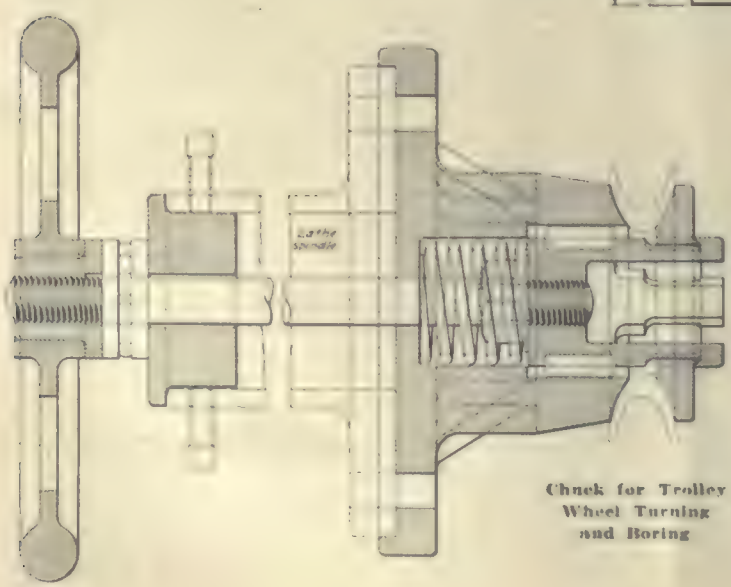
Bottom Half Axle-Lining Brass with Window Babbitted for Use as a Top Half

## Chuck for Machining Trolley Wheels

IN THE new Hillcrest shops of the Toronto Transportation Commission, Toronto, Canada, a new form of chuck has been developed that makes it possible to bore and turn trolley wheels at one operation. The main casting of the chuck is attached to the lathe, and the outer end is turned to fit the inside contour of the trolley wheel. An arbor fits inside the main casting which is arranged with arms which project through the spokes of the wheel, and these in turn are provided with projections to act as chuck jaws. A locking ring with slots to fit over the chuck jaws is shaped to fit inside the contour of the trolley wheel and hold it firmly




Spring Tool Holder and Tool for Machining Trolley Wheels




Chuck for Trolley Wheel Turning and Boring



hen in position. After the trolley heel is inserted, the retaining ring n be shoved over the chuck jaw and ien with a 45-deg. turn the retain-g ring is locked so as to hold the heel tight. With this design of uck, both the hub of the wheel and ie grooved portion are left free for achining.

The groove is turned in the wheel a special tool, as shown in the ac-mpanying illustration. This gives ie correct shape in one operation. he tool holder is arranged with a ot so as to provide a spring action. se of this chuck, together with the ecial tool, has made it possible to aintain trolley wheels at a much educed cost, and in addition, they re uniform in size and shape. The uck was designed under the super-sion of W. R. McRae, superin-ndent of rolling stock.

## Wheel and Gear Pressed Off Together

T IS the practice in the Albany Street shops of the Boston Ele-ated Railway to press wheels and ears on and off together. This is one on a Wood hydraulic press, hich is arranged as shown in an ccompanying illustration. An axle ith wheels and gear attached is wung into position in the machine. he gear rests against the large



ears and Wheels Are Pressed Off Together by a Hydraulic Machine in the Boston "L" Shops

lock in the center, while pressure s applied to the end of the axle at he right. For 33-in. wheels a force f about 130 tons is required for ressing off.

When it is desired to press off a wheel without removing the gear lso, the force is applied at the rim. This procedure destroys the shape of the wheel, but inasmuch as the wheel is to be scrapped anyhow this is no drawback. No pressing is ever done by means of rods placed through holes in the web of the gear.

## Special Truck for Baking Armatures on End

BY F. C. LYNCH
Shop Supervisor Kansas City Railways

THE accompanying illustration shows a small truck used by the Kansas City Railways for moving armatures in and out of the baking



This Simple Truck Enables Armatures to Be Conveniently Handled on End in Connection with Dipping and Baking Work

oven, and for storing them while they are in the oven. Two trucks of the same design are used for this work.

Armatures are dipped with the pinion end down, and are stored in this same position on the baking truck. The truck itself is made up of angle-iron framing, mounted on cast-iron flanged wheels. A wood floor is bored out so that the pinion and that end of the shaft protrudes through. It has a capacity for eight of the larger sized armatures.

## Burning Insulation Off Flat Conductors

WHERE strap-wound field coils are to be rewound or repaired the removal of the old insulation presents quite a problem. In the shops of the United Traction Company, Albany, N. Y., this is accomplished by passing the insulated conductor through a gas flame and then drawing it through a pair of rotating wire brushes. In order that the gas flame may extend along a section of the insulated conductor the flame is fed into a cylinder and the insulated conductor is pulled through this. Immediately after it comes out of the gas flame it passes between the motor-driven wire brushes, which remove any remnants of insulation and clean the conductor. A galvanized iron housing around the brushes prevents the dust and refuse from flying about.

## Salvaging Controller Segments

WHEN the ends of the longer controller segments become burned from arcing, it is the practice of the mechanical department of the Twin City Rapid Transit Company to shear off the burned ends and utilize the pieces thus salvaged for replacement of some of the smaller segments on the controller cylinder.

Due to the curved contour of the segments this is a rather awkward shearing job. A simple shearing jig shown in the accompanying illustration speeds up this work materially. It consists of a small curved block of the proper shape to fit the segment which is to be cut off, and has a guard under which the segment fits. The outfit is set up in a punch press.



The Burned Ends of Long Controller Contact Segments Are Sheared Off in a Simple Jig, Set Up in a Punch Press in the Twin City Rapid Transit Company's Shop

# New Equipment Available

## Improved Door Operator

MANY improvements in design and refinements in manufacture have been incorporated in its latest type of door operator for folding doors and steps by the Consolidated Car Heating Company, Albany, N. Y. By providing for installation of the door engine so that its shaft will be vertical, the levers that operate the door are brought into a horizontal position. This insures a tight fit at all joints and minimizes wear. On installations with doors of the usual size but two ¾-in. air pipes are needed to serve the door engine. Phosphor-bronze bearing liners are provided for the operating shaft, and a honed finish is given the inside of the cylinder in which the piston slides.

The connection between the operating shaft and the piston is through a quadrant gear and rack, which constitutes the spindle for the pistons. A hexagonal fit between the gear and shaft insures an accurate fit without likelihood of wear. By removing the cover, which is held in place by two cap screws, the gear and shaft can be lifted out for inspection. In operation, the chamber about the gear is kept filled with a light grease. This can be replenished from a grease gun through a hole with filling plug without disturbing other parts of the door engine. The gear and rack have machine-cut teeth, which insure smooth operation and long life.

The piston leathers and phosphor-bronze expanders at the ends of the rack are held in place by nuts. The exhaust end of the rack is provided with a by-pass valve which prevents pressure building up in the closing cylinder while the door is being shut.

If closure of the door is stopped by a passenger or some obstruction the air is vented to the atmosphere from the closing cylinder, so that when the obstruction is removed the door continues to close at regular speed with no tendency to slam. The by-pass has a ball valve held against its seat by spring pressure. With the door fully closed this spring pressure is increased to prevent operation of the by-pass. This construction permits the use of separate speed control valves, so that the door-closing speed can be adjusted independently of the cushioning, which slows down movement of the door just as it reaches the end of its stroke. These adjustable speed-control valves provide for regulation of the speed with which the air is exhausted from the cylinder, while there is no check on the speed with which air is admitted.

The door engines are controlled either by a straight pneumatic control valve or electrically by push buttons. On cars provided with Safety Car Devices equipment the engine is controlled from the brake valve. With straight pneumatic control only two connections are used, one for the air supply and the other for exhaust.

For the electro-pneumatic control, a new magnet valve or duplex valve, as it is termed by the manufacturer, has been designed in which a single valve controls both opening and closing of the door. The valve is energized to open and de-energized to close, so that an open circuit or ground ahead of the valve coil will close all doors. The single unit construction for the master valve simplifies wiring and piping connections and also results in considerable reduction of maintenance cost, as there are fewer parts to be inspected and looked after. For cars which are equipped with single folding doors and steps, or where selective control of doors is desired and where the work of the door engine is light, a smaller differential engine has been developed.



Improved Door Operator for Folding Doors and Steps

## Glue Pot with Rheostatic Heat Control

TO RETAIN those qualities that give it maximum adhesiveness, glue must be carefully heated and handled. With the requirements of different temperatures to produce certain results has come a demand for a glue pot with heat control. The Westinghouse Electric & Manufacturing Company has brought out such a pot, which gives a wide range of heat control and at the same time keeps the unit simple and inexpensive. It also permits almost unlimited variation in the power input and in temperature.



Dry-Type Glue Pot with Rheostat for Heat Control

The unit is portable, as the rheostat can be laid on a bench or shelf or hung on a wall, while a flexible cable permits the glue pot being moved over a large radius, so that it may be placed at the best location, saving many steps to a central glue pot.

The dry-type glue pot is used with this new unit because of its many advantages over the wet type. Refilling of the water bath is eliminated and there is no danger of the pot boiling dry and burning out the heating element.

The casing and bottom plate of the pot are made of heavy sheet steel and the glue vessel of heavy spun copper. The glue vessel may be removed easily for cleaning.

# The News of the Industry

## Higher Fare Upheld

### Superior Court Affirms Decision of Commission Authorizing Eight Cents in Philadelphia

Judge William H. Keller of the Superior Court handed down a decision on Dec. 5 affirming the temporary order of the Public Service Commission granting the Philadelphia Rapid Transit Company an increased rate of fare. The increase is from 7 cents, with four tickets for 25 cents, to 8 cents, with two tickets for 15 cents. The court ruled that the company had justified its request for an increased rate by concrete evidence and that the commission was wholly within its rights as defined by law in granting a temporary order. The ruling also upheld the $200,000,000 valuation of the commission, which had been disputed by the Governor and Attorney-General. They had contended that the valuation of $200,000,000 and upward was not an actual valuation and should not be so considered as a basis for rate making. The ruling also stated another principle, namely, that rate making was wholly a legislative function and that the commission acted only as an agent of the legislative branch.

#### Final Action Ahead

The Public Service Commission will now take action toward a final ruling on the company's petition for an 8-cent cash fare. City Solicitor Gaffney has indicated that there were two courses which the city might now adopt—an appeal to the Supreme Court or an appeal to the Public Service Commission for another revaluation. The second proposal is under consideration by Milo R. Maltbie, a public utility expert, recently retained by the Governor to advise the commission on the necessity or wisdom of reopening the valuation of the company. Mr. Maltbie had been engaged after the Governor had sent a letter to the Public Service Commission intimating that it had been guilty of disregarding the public interest in increasing the fare. Following this communication the Attorney-General gave an opinion to the commission to the effect that no valuation of the company had been made in accordance with methods prescribed and along the lines specified by the Supreme Court.

The court asserted the commission was not required by law to fix a definite valuation of a public utility in determining rates. The fact that the commission found the company's property worth upward of $200,000,000 was sufficient, in the opinion of the court, to warrant its order increasing rates.

Applying this principle specifically to the case at issue, the court said:

> The only party hurt by the failure of the commission to fix the sum over and above $200,000,000 is the utility company, and if it does not complain the other party who has suffered no injury by this action cannot be heard to say that it is no finding at all.

The court ruled that the burden of proving that the proposed increase of rates was justified rested on the company, and the evidence was so substantial that no court could declare an order founded upon it to be illegal or grossly unreasonable.

The opinion went on to say that a finding based upon competent evidence sufficiently specific to pass the legal tests, that a company's property is valued at more than $200,000,000, was not to be cast aside as of no weight for any purpose because the commission did not find the exact amount by which the company's property exceeds that sum. It is the duty of the commission at all times to guard the interests of the public, but this is to be done in no spirit of partisanship or hostility to public service corporations. It is required to do justice to the corporation no less than to the public.

Judge Keller in affirming all the contentions of the commission did disagree on the wage-dividend fund. He said that the 10 per cent wage-dividend fund "is not a proper charge against operating expenses, but must be provided for, if at all, out of the company's fair returns on investment."

The statement said in conclusion that it found nothing in the commission's statement to complain of which required a reversion of its order, that the counsel merely emphasized what was inherent in the company's evidence, that is, the growing lack of sufficient revenue under the 7-cent fare and the hardship to the company of having to continue it during a protracted hearing. The assignments of errors were all overruled, the appeals were dismissed and the order of the commission was therefore affirmed.

#### Company Reviews Fare Changes

In this connection it is interesting to note that Mitten Management in "Service Talks" for Dec. 4 refers to the "colossal mistake of the 7-cent fare." The company says:

> If the straight 5-cent fare had been granted in 1920, P. R. T. would each year have earned so much more than it did under the 7-cent fare that not only would the increase to 8-cent-cash-two tokens-for-15-cent fare have been unnecessary, but the straight 5-cent fare would still be sufficient for our needs. The folly of overriding the opinion of a successful operating management, as was done in this case, should have been apparent before the colossal mistake of the 7-cent fare was made.
>
> The 7-cent fare, in spite of our efforts, was forced upon this management in November, 1920. In 1921 P. R. T. carried 75,000,000 fewer riders than in the previous year—$3,750,000 worth of nickel fares. P. R. T. has never since reached the record riding of 5-cent fare days. The 7-cent fare results proved the engineers' estimate to have been wrong, while that which Mitten Management prophesied actually came true.

But, says "Service Talks":

> P. R. T. must continue the present fare to meet added operating costs and to support unprofitable extensions now in contemplation. P. R. T. can never re-establish the 5-cent fare with free transfers, since the city must depend upon P. R. T. to earn an ever-increasing sum to support city-built subways.

It is explained that the mounting costs which had everywhere else brought increased fares forced P. R. T. in 1920 to seek a means of increasing its revenue. Mitten Management recommended a straight 5-cent fare, with the elimination of all free transfers and 3-cent exchanges. The statement says:

> P. R. T. Bankers urged an increase to 7 cents, fearing the effect upon their interests elsewhere with P. R. T. proved continuously successful under a 5-cent fare.

Reference is also made to the fact that Mr. Mitten had "publicly declared that the 5-cent fare was 'almost a religion' of his."

## Mr. Insull and Mayor Dever of Chicago Discuss Transit Responsibility

Samuel Insull and Mayor Dever of Chicago engaged in an impromptu but spirited debate at the annual dinner of the Chicago Real Estate Board on Dec. 4 over the negotiations and projects for more rapid transit in Chicago. Mr. Insull, who has offered to build a subway to carry his elevated trains under the Loop district, told the Mayor in a public address to "say it with shovels" if the city intends to use its $40,000,000 traction fund to dig a tube. Mr. Insull said that Chicago is being stifled by lack of transportation, because the city does nothing and won't let others do anything.

Mayor Dever retorted that the elevated lines had ignored franchise grants made years ago to give Chicago a rapid transit system and had gone out into a cow pasture with a recently inaugurated extension to the town of Niles Center, west of Evanston, instead of spending the money inside the city.

The Mayor said later that a referendum on using the $40,000,000 for a subway or as the foundation for a $400,000,000 financial structure to coordinate the lines was certain in February.

## More Study of Subway Plans Recommended at Boston

A report has been filed for the Massachusetts Legislature by the Boston Transit Commission and Public Utilities Department, which have been sitting jointly as a recess commission to study the problems of the future extensions of the rapid transit system in Boston. The report discusses extension of the East Boston Tunnel from Bowdoin square, under Green Street and Staniford Street, joining the present elevated at Causeway and Lowell Street, near North Station, at a cost of

$1,500,000; also extending the East Boston end of the tunnel about 1 mile at a cost of $4,000,000.

Another proposition outlined in the report is the removal of the subway incline in Cambridge Street, extension of the East Boston tunnel to run under Cambridge and Charles Street, with a station in Charles Street to connect with the present Cambridge subway to Park Street. This work would cost $2,500,000. If it were carried out another important transfer point would be established which would relieve Park Street.

In connection with this report the commission recommends that nothing be done at present, because the two permanent projects referred to have not had sufficient study.

## Buffalo Council Against One-Man Cars

Despite the opinion of the city law department that the ordinances are unlawful, the City Council of Buffalo has enacted two measures in its movement to prohibit the operation of one-man cars on all local lines of the International Railway. "Within 24 hours after the ordinances were enacted motorcycle police arrested eight operators of one-man cars on a charge of speeding. The test cases will be tried out in City Court. The car operators, through counsel for the railway, entered pleas of not guilty and their trials will be held late in the month. The basis of the action by the city against the operators who were arrested is that they were running their cars in excess of 6 m.p.h., the speed limit fixed in one of the recently enacted measures.

## Interurban Terminal at Akron Being Used by Bus Patrons

Cement has been laid between the first two tracks in the trainshed at the terminal of the Northern Ohio Traction & Light Company in Akron and a union bus terminal established. Bus lines using the terminal are the Cleveland-Akron Bus Company, Northern Transit Company, Akron-Youngstown-P.O. Electric Company, Akron-Canton Trackless Coach Company, Akron-Medina-Elyria Line, and Akron-Wooster Line.

This union terminal is proving a great convenience to passengers who desire to transfer from one line to another or from a bus line to an interurban railway line. The terminal facilities at Akron are unusually complete, the station there being one of the finest of its kind in the United States.

Buses enter the trainshed on the south side of the terminal building, and leave from the north. When the union motor coach station was opened the "tunnel" through which passengers went to interurban cars was temporarily abandoned. It will be used only on special occasions. Walks have been laid across the tracks and passengers go directly through the gates to their cars.

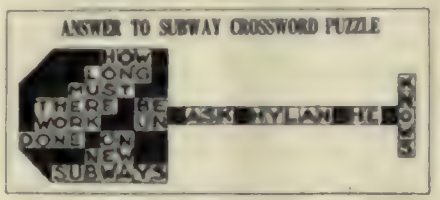
A new union time card has been issued containing the timetables of all lines entering and leaving the terminal.

# Hylan's Subway Plan to Cost $400,000,000

### Four Boroughs Included in Project—Manhattan to Have Trunk Line—Brooklyn and Queens Also

Mayor Hylan's municipal subway plan was made public by his Board of Transportation today. The principal feature of his project is a new Manhattan trunk subway from the lower end of his island to Mayor Hylan's 193d Street. There are also tentative plans for a Hylan Brooklyn-Queens line and connections under his East River with his new route in his Manhattan. His four boroughs are included in the general plan, which contemplates a subway beneath his Grand Concourse in the Bronx.

This is the lead, slightly amended, which the *Sun* carried on the story published in the issue of Dec. 9 about Mayor Hylan's new proposal. The only part of the plan actually adopted by the Board of Transportation on Dec. 9 dealt with the lower portion of the new Manhattan trunk line, the upper part of this route having long




New York "World" Pokes Fun at Hylan

since been approved by the Board of Estimate. The upper portion, from 64th Street and Central Park West to 193d Street and Overlook Terrace, was laid out by the Transit Commission a long time ago and formally adopted by the Estimate Board in August, 1923.

The money to build it has never been appropriated by the city authorities and the plan has marked time since. The plan just announced reveals that a substantial part of the Hylan project in Manhattan is virtually identical with Transit Commission routes.

Together with the lower section which was adopted by the Transportation Board, the new Manhattan trunk line will start either at Fulton or Wall Street and East River running to Church Street, to Greenwich Avenue, to Sixth and Eighth Avenues, to 53d Street, then under Central Park West, St. Nicholas Avenue, to Broadway and Fort Washington Avenue to 193d Street and Overlook Terrace. The line will cost about $167,500,000 to build. The route mileage will be 16.65.

The Brookyln-Queens portion of the new underground system is to have a crosstown route similar to that proposed by the Transit Commission, and in part approved by the Board of Estimate in August, 1923. The new project as tentatively mapped out calls for a crosstown subway, the lower end joining with the Brooklyn Manhattan Transit Company Culver line which the city intends to recapture and the upper end running into Long Island City, connecting with the 53d Street tube and then proceeding far into suburban Queens.

The Brooklyn-Queens part of the system was not formally put before the Estimate Board at this time, but its general layout was indicated by the map made public by the Board of Transportation tracing the project in the three boroughs.

The entire system will cost approximately $400,000,000.

Supreme Court Justice McAvoy, who has been commissioned to inquire into the transit situation, will begin the inquiry on Monday morning, Dec. 15, at 10:30 o'clock in the rooms of the Bar Association, 42 West Forty-fourth Street, New York. Announcement has been made that Henry L. Sherman will be counsel for Judge McAvoy in connection with the inquiry. Mr. Sherman is a member of the law firm of Hirsch, Sherman & Limburg. He was graduated from Yale and is considered a lawyer of rare ability and astuteness.

Max D. Steuer has been retained as special counsel for the city in the transit investigation. Former Supreme Court Justice Clarence J. Shearn, who has been special counsel to the commission, has been advising the members of the commission and will continue to act as special counsel during the progress of the inquiry.

## Elaborates Boston Plan

Mayor Curley of Boston on Dec. 4 submitted a brief embodying his views on the desirability of turning over the entire electric railway service of the metropolitan district, within a radius of 15 miles of Boston, to a board to be known as the Metropolitan Transportation District Commission. This supplemented remarks made by him previously before the joint legislative committee investigating the Boston Elevated Railway.

The Mayor said that if adequate street railway transportation was recognized as an absolute essential in the metropolitan district there could be no valid objection to the operation of such system by a Metropolitan Transportation District Commission with authority to fix fares and arrange financing.

Personally, the Mayor believes that a 5-cent fare locally in each city and town of the metropolitan district with a graduated fare on the high-speed lines sufficient to cover fixed charges and higher operating expenses is equitable and should prove profitable. In the event that the Metropolitan Transportation District Commission should in any year encounter a deficit he favors an assessment upon such portions of the metropolitan district as are served by the railroad upon the basis of population and valuation.

As the Mayor sees it, adequate transportation is as essential as water, sewerage and public parks. He says there is a menace not only to the large retail and manufacturing establishments in the cities and towns of the metropolitan district, but there is in addition that which constitutes confiscation of the dividends of a lifetime of toil and thrift on the part of the worker who awakens to find that the railway which transfers him from his home to the place where he earns his livelihood has been abandoned because it did not prove a profitable investment for the owners.

## Bus Applications Denied by New York Commission

The Public Service Commission on Dec. 5 denied the application of James W. Dillon and Homer R. Peacock for a certificate for the operation of a bus route between Syracuse and Wolcott. The evidence showed that the proposed bus line would compete with the Empire State Railroad Corporation, the Lehigh Valley, the Rochester & Syracuse Electric Railroad and the New York Central, and with bus lines operated by George T. Wood and Vernon Waterhouse.

The commission also denied a petition by James W. Dillon to operate a bus line between Syracuse and Borodino. It was shown that this proposed line would compete with the Auburn & Syracuse Electric Railroad and that the communities were well served by the electric railway. The Marcellus village and town authorities opposing the granting of a certificate to Mr. Dillon.

## Considers Suspension of Service Order for Schenectady

A hearing was held before Public Service Commissioner Van Voorhis at Albany, Dec. 3, on the petition of the Schenectady Railway, Schenectady, N. Y., filed on July 30, to be relieved from complete compliance with the order of the commission of April 4 1923, which directed the purchase of certain additional equipment for local and interurban service. The order of the commission was the result of hearings held on complaint of patrons of the railway and the Mayor of the city of Schenectady.

At the recent hearing, the attorney for the railway stated that the Mayor of Schenectady and the Corporation Counsel were agreeable to a suspension of the order, as practically all of its terms had been complied with. The order of the commission directed the purchase of twelve new city cars, of which ten have been purchased, while the company has provided three of the six new cars directed for interurban use. Other snow removal equipment and increased facilities have been provided and the company is doing everything possible to meet the needs of the public.

An inspection of the property of the company will be made by the engineer of the commission, and if his report is satisfactory the commission will issue an order in accordance with the application of the company.

## Arguments Heard on Taxing Seattle-Owned Utilities

Before the Seattle Municipal League members, the proposed plan to require city-owned utilities to pay a 5 per cent gross earnings tax into the general fund was recently debated by Councilman W. T. Campbell, backer of the proposed measure, and Oliver T. Erickson, former Councilman and supporter of municipal ownership. Councilman Campbell argued that city-owned utilities are participating in the benefits of other city departments without contributing to their support. He also argued that requiring the utilities to bear directly part of the cost of government would result in increased business that would more than make up for the tax.

Mr. Erickson replied that handicapping the municipal utilities with a 5 per cent gross earnings tax was a queer way to show belief in public ownership, and characterized the ordinance as a measure to penalize residents of Seattle for their loyalty in supporting the city-owned water and light plants and street railway.

## Tunnel Suggested

### Combination Tube and Subway Plan to Connect San Francisco and Alameda Shore Advanced by A. J. Rich

A bridge across San Francisco Bay will soon be a reality. Work on the structure is scheduled to start by March 5 next. A permit from the United States War Department for this project is now in the hands of Col. Frank E. Webb, representing a company which is to build the bridge. Colonel Webb also announces that his concern has raised sufficient funds and is ready to start work. The span will cost about $7,000,000 and be 7 miles long, including the approaches. The terminals, according to tentative plans, will be at San Mateo on the San Francisco side and at a point opposite Hayward on the East Bay shore.

The Webb interests have been granted a 50-year franchise by San Mateo County on condition that at the end of that time the property revert to the state of California. So far no franchise has been issued by the Alameda County Board of Supervisors.

There are many plans which it is claimed will improve traffic, but one of those that is given most serious thought is the plan of A. J. Rich of San Francisco for a combination tube and subway to connect San Francisco and the Alameda shore.

The Key System Transit Company, on the other hand, handles local traffic almost entirely. It charges, as does its rival, an 18-cent fare for the ferry trip, with a monthly commutation rate of $4.50.

The project calls for an expenditure of $60,000,000 to be raised privately. Mr. Rich says that he and his associates have been working on the scheme for the past three years.

The Rich plans call for a bridge and underground tube between Hunter's Point on the San Francisco side to a point opposite on the Alameda shore. Here the bay narrows, thus offering an easier engineering problem than the Goat Island plan, which has been the popular one heretofore.

Oakland occupies a position in relation to San Francisco similar to that which Staten Island does to New York. There is no municipal ferry at Oakland, but there are two ferries, one operated by the Southern Pacific Railroad and the other by the Key System Transit. A large portion of the Southern Pacific ferry traffic consists of passengers discharged from overland trains which have their terminus in the Oakland Mole.

## Physical Culturist Has Subway Idea

Bernarr Macfadden, physical culturist, newspaper owner and hiker, who is reported to walk from his country home in Nyack, N. Y., to his office in New York City every week day in order to stretch his own legs, has evolved a plan for solving New York's transit problem. He has worked out the idea of a double-deck subway car and has offered to form a company to build a model vehicle of this kind.

This idea he has exploited with a great deal of gusto through his own New York *Evening Graphic*, a picture paper which discusses editorially such a comedy as "Marriage As It Should Be," written and signed by Mr. Macfadden. Mayor Hylan, accommodating soul that he is, says he will commend the project if it proves of practical value. Mr. Dahl of the Brooklyn Manhattan Transit Company says to Mr. Mcfadden that the B.-M.T. has adopted the policy of considering on its merits any suggestion intended to improve transit conditions. As *Graphic* is supposed to live up to its title illustrations drawn by imaginative artists have been used to adorn the story which the paper has been running. One of these depicts riders in one of Mr. Macfadden's cars apparently forgetting their transit troubles while devouring the *Graphic* or *Physical Culture Magazine*, another Macfadden publication.

## Court Restrains Kansas City Jitneys

Judge Van Valkenburg in the federal court at Kansas City, Mo., on Dec. 2 issued an injunction against the operation of either interstate or intrastate buses carrying local or other passengers in Kansas City, Mo. This development was of extraordinary interest because the railway receivers had previously filed with Judge Stone a report recommending operation of buses by the railway, contingent for one thing on the elimination of competition. The injunction was filed at 3:40 p.m. The bus company had been operating since Jan. 1 under various managements. It suspended operations at once.

The order was directed specifically against F. B. Miller, R. E. Ahlvin, Hiram H. Moore and P. R. Guthrie, who took over the interstate line between Kansas City, Mo., and Kansas City, Kan., and the crosstown bus lines in Kansas a few months ago. The order is based on the "jitney" ordinances of Kansas City, Mo., passed by Council on March 22, 1921, and July 13, 1921.

A section of the order prohibits operations of buses, which the court says come within the description of jitneys in the ordinance, on any streets unless all the provisions of the ordinance with regard to consent of owners residing in Kansas City of a majority of abutting frontage on designated routes. The order also specifically prohibits operation on streets having street car lines, as being contrary to the ordinances mentioned.

## New Ordinance Proposed for Cincinnati System

Elimination of the present service-at-cost street car franchise for the Cincinnati Traction Company is provided in an ordinance initiated by the Citizens' Committee, headed by Eli Frankenstein and William J. Schultz, attorneys. A copy of the ordinance, together with formal notice that the committee proposed to circulate petitions for a referendum election on it, has been filed with the city auditor of Cincinnati.

The outstanding feature of the proposed measure, which would repeal all former ordinances, is that it provides a flat 7-cent rate of fare. It also provides that tickets are to be sold in strips of two. The rate of fare for children is fixed at 3½ cents. A universal transfer system without extra charge is provided. The ordinance gives the director of public service control of service.

The ordinance is a 25-year franchise and provides for revision at the end of each 5 years. The measure almost entirely eliminates the office of director of street railroads, confining his duties to the gathering of data for the information of the service director and City Council. The proposed measure eliminates the $350,000 annual franchise tax.

Mr. Frankenstein says that filing of the petition blocks all further negotiations with the city, the officials of the traction company and the Cincinnati Street Railway leading to a new franchise.

## Traction Man a Government Beneficiary

An humble railway servant became a national figure on Dec. 6, when the United States government initiated him *ex cathedra* into the taxpayers' refund fraternity. His associates included financiers, business magnates and even Julia Marlowe, herself. They all received a substantial return for Uncle Sam's gouging practices, but the utility man, as tradition demands, graciously accepted an award of 1 cent. Burr Martin, vice-president and general manager of the Texas Electric Railway, Dallas, Tex., may use this contribution toward his rehabilitation program for 1925. At any rate, he can comfort himself he didn't get the worst of the game—many got nothing.

## Bus Lines Compete with Toronto Municipal Railway

Operation of bus lines from the city of Toronto, Ont., to adjacent municipalities is a new problem which is causing executives of the Toronto Transportation Commission considerable trouble. The Toronto *Globe* explains that as the law stands at present, buses operating from one municipality to another cannot be controlled or suppressed by either municipality. Consequently, there is nothing to prevent private companies operating buses in all the outlying sections, thus robbing the T.T.C. of revenue on the parts of its system which at present are the least profitable. If buses are to be allowed to operate on the Weston Road, York Township and Weston will likely give up the idea of taking over the suburban radial, as it would be almost impossible to make the line pay against competing buses operated only at the profitable periods. It is probable that the question will be brought before the Legislature at the next session in order that the act may be so changed as to permit the regulation of interurban bus transportation.

## Labor Reiterates the Doctrine of Resistance

Samuel Gompers chose the occasion of his election to the office of president of the American Federation of Labor for the forty-fourth time to announce the following policy:

> An industry that cannot pay a living wage according to our American standards of civilization had best get out of business. The American labor movement has adopted a slogan: "It is better to resist and lose than not to resist at all." Let it be clearly understood, come what may, be the result what it may, the American workers will resist any attempts to cut wages, no matter what the result be to industry.

## Another Warning to Careless Motorists

In order to arouse Milwaukee, Wis., motorists to a sense of watchfulness in approaching and crossing street intersections, a local newspaper started a safety campaign in which it has had the full co-operation of the Milwaukee Electric Railway & Light Company. The accompanying picture shows the part taken by the railway company in its efforts successfully to put over this safety drive. It changed one of its work cars to a moving advertisement by mounting on it a badly wrecked automobile with appropriate accident signs. The car traveled through the streets of the city during the campaign as a constant reminder to the motorist in the city and in outlying territories to be more careful on the streets, especially when approaching intersections where electric and steam line tracks are crossed. The compilation of figure by the Safety Commission shows a big increase in the number of accidents at street intersections which involved motor vehicles.

## Bus Regulation Taking Form in Massachusetts

Rigid regulations for the operation of buses in Massachusetts are growing out of the joint jurisdiction of the Public Utilities Department and the city and town authorities vested with power to issue or withhold licenses. The latest chapter comes from a settlement of a controversy in Northampton where the Northampton Street Railway appealed from rules that had been promulgated by the City Council. The Public Utilities Department has refused to rule against aliens as owners of bus lines.

The department also rules that motor vehicles used exclusively for sightseeing purposes or for carrying guests to and from hotels are not exempt from regulation by the city authorities. Under the department's ruling also licenses from the Northampton City Council will be required for the operation of motor vehicles in that city.

One important regulation promulgated requires that every licensee shall operate for 9 or more hours daily, unless accident or unavoidable cause prevents such operation, and the minimum period of operation shall be fixed by the City Council in the case of each permit granted. On routes using the same terminals as are used by electric railways, not less than 12 hours daily operation is required by the Council unless avoidable cause prevents.

**To Test Regulation of Bus Rates.**—In an effort to define the extent of control by municipalities and the Michigan Public Utilities Commission over interurban buses, the Michigan Highway Transportation Association will seek a court ruling on legality of the new Lansing city ordinance regulating rates of interurban buses in that city. A temporary injunction is expected to be asked, as the ordinance takes effect Christmas Day. Bus operators claim the ordinance favors a competing company, the Michigan Electric Railway. They hold that cities do not have such regulatory powers, except to afford protection to the public and that control rests with the state commission.




Price of Carelessness Driven Home in Milwaukee Exhibit

## Strike Over

**Tentative Agreement Between Company and Men Reached in Southern and Central Illinois**

Employees of the Illinois Traction System (McKinley lines), on strike since Dec. 7, were expected to return following a tentative agreement between the men and officials at a conference in Springfield on Dec. 11. The agreement, which was to be submitted to various local unions on Dec. 12, covers the question of the closed shop, overtime pay and arbitration of wages.

The tie-up of passenger and freight service occurred within six hours after officials of the system claimed they were advised the strike would be called. The company is said to have been unwilling to meet the demands of the men for an advance in wages of 10 cents an hour, time and one-half for overtime and closed shop conditions. Under the old wage contract, which expired on Dec. 1, brakemen were getting 50 cents, passenger motormen and conductors 62½ cents and freight crews 65 cents.

More than 100 towns and villages in southern and central Illinois were affected by the strike. Out of the system's total mileage of 500 miles approximately 400 miles were involved. Trains continued to operate between St. Louis and Granite City, Ill., over the St. Louis Electric Terminal Railway, a subsidiary, and on the Joliet-Princeton division, the workers on those divisions having separate wage contracts with the railway.

The strike did not affect local properties in Peoria, Bloomington, Decatur and Danville, where wages were recently decreased by an arbitration board.

D. W. Snyder, vice-president, at Springfield, Ill., issued a statement in which he asserted the strikers' committee of five had dealt unfairly with the company and the public by giving only six hours' notice of the intention to strike. Tildon E. Goddard of St. Louis, a member of the committee, denied this charge. Mr. Goddard stated the workers were polled on the question of striking, the vote being 267 for and 18 against.

Following conferences between officials of the company and the strikers on Dec. 8. A. McGuire, international representative of the union, declared the men were willing to waive their demands for an increase of 10 cents an hour if the company would grant overtime of time and one-half for more than ten hours' work. However, this proposal was not put up to officials of the railway.

Vice-president Snyder said it would be financial suicide for the company to submit to the demands for increased wages, pointing out that since the last wage agreement was reached the income of the system had shown large losses instead of gains as was expected.

No attempt was made by the company on Dec. 8 or 9 to move cars over the system, but much of the inconvenience incident to a strike of this kind was removed by automobile trucks and buses, as many of the towns along the traction system are situated on hard roads. Steam railroads took care of the mail contracts of the system.

The propositions submitted by the company to the men follow:

"1. That the committee of five should have authority from the rank and file of our men to negotiate a new agreement; that pending such negotiations an agreement should be made continuing the last contract (except as to wages) until a new agreement should be made; that the wages finally agreed to should be retroactive to Dec. 1, 1924.

"2. While this company, in its efforts to continue railway service in its territory, has urgent need for reduced expenses and believes a new contract should carry with it lower costs, we are willing to co-operate to the extent of agreeing to the renewal of the recently expired contract for a period of from three to six months. This was later extended by the company to a full year.

"3. Believing that our position is fair and one that will stand honest examination, we proposed that the committee and the company enter into an agreement to submit the entire matter to arbitration, as arranged for in our last contract."

## Maryland Railway Outlines Extensive Bus Program

R. Paul Smith, secretary of the Blue Ridge Transportation Company, has filed a schedule with the Public Service Commission of Maryland covering 18 interstate and intrastate lines utilizing Maryland highways. At the same time Mr. Smith has pointed out that the Maryland roads constitute only a small part of the highway mileage planned for use. The company has already absorbed independently operated lines in the Baltimore-Frederick and Washington-Frederick districts and has signified its intention of acquiring through purchase the permits of other small, independent operators in other districts.

The application is regarded as of particular interest as indicating the first step in a comprehensive plan for the more intensive use of the bus by the Potomac Public Service Company, of which Mr. Smith is general manager. That company, through its various subsidiaries, now controls 91 miles of electric railway, operated mostly from Frederick, Md., as a center.

## Final Arguments Heard on Interstate Bus Case

An early decision is expected from the United States Supreme Court in cases involving the degree of authority that States may exercise over interstate traffic over public highways.

The appeal of Buck vs. Kuykendal was argued before the court on Nov. 25. This involves not only the primary question of interstate control, but the added factor of state control over a federal-aid highway connecting two or more States. Buck was refused a permit in Oregon to operate an interstate bus line for through business only between points in Oregon and points in Washington. The lower courts upheld the state commissioner.

The appeal of the Michigan Public Service Commission against the Duke Cartage Company was presented the court two days before the Buck case. This involves state regulation of traffic over an interstate highway not built with the assistance of federal-aid funds.

Counsel were asked a number of questions by the justices in order to bring out points which struck the court as of especial importance in the issues.

## News Notes

**Baltimore Employees Receive 2 per Cent Increase**—Shopmen and trainmen of the United Railways & Electric Company, Baltimore, Md., in the annual conference of various classes of workers with President Emmons, were granted a 2 per cent increase in wages. The advance, affecting 5,000 men, will be effective Jan. 1, 1925. As a result minimum wages of shopmen will be 47 cents instead of 46 cents an hour and trainmen's wages will be 52 cents an hour instead of 51 cents.

**Seeks Bus Permit.**—The Portland Electric Power Company, Portland, Ore., has applied to the City Council for a franchise to operate a bus line in the St. Johns district, to supplement the present car service. The application provides for a 10-cent initial fare, with such changes as are required by cost of operation determined from time to time. The application also provides that the company shall pay to the city $100 as an annual fee and $1 a seat a quarter for all buses regularly operated. Thirty-minute service will be furnished.

**Free Rides Mark Reopening of Road.**—As part of its program to make restored service in Kewanee, Ill., a success the Kewanee Public Service Company invited residents of the city to ride free on the cars on Nov. 29, the day service was resumed. In an effort to popularize the service, the $1 weekly pass has been instituted. The restoration of service by the property, at one time under the management of the Galesburg & Kewanee Electric Railway, was referred to in the ELECTRIC RAILWAY JOURNAL, issue of Dec. 6.

**One-Man Cars in Service.**—Five one-man cars were in operation, on Dec. 8, on the lines of the Springfield Railway, Springfield, Ohio. Others will be placed in service in the near future.

**Bill Would Limit Parking.**—A bill is before the Mayor of Louisville, Ky., which will prohibit parking of autos on Fourth Avenue, Louisville, between 6:30 and 9 a.m., and 4:45 and 6 p.m. This plan is expected to speed up traffic materially, especially during the evening rush hours. It will not affect parking during shopping hours to any extent.

**Use of Tokens Increased.**—Since early in September, 1923, the Johnstown Traction Company, Johnstown, Pa., has been operating at a rate of four tokens for 30 cents and 10 cents cash instead of the former 7-cent cash and ticket rate. As a result of the present differential between the cash and token rates the use of tokens has increased to a point where now about 98 per cent of all revenue passengers use tokens.

**"Feeder" Lines Start.**—The Indianapolis Street Railway, has begun the operation of "feeder" buses in two districts of Indianapolis, Ind., where the car lines have not been extended as fast as the residence district built up. Preparatory to establishing the service, the company officials entertained 50 city officials making a trial trip in two of the buses. Robert I. Todd, president

of the company, presided. It is the company's intention to place buses in operation at the ends of other street car lines.

**Bus Measure Proposed for Georgia.**—It appears practically certain that the next Legislature of Georgia will be called upon to consider several motor bus franchise bills and it is predicted that some measure of this nature will be passed to equalize the road maintenance taxes.

**Hearings on Bus Fares Will Be Resumed.**—Hearings will be resumed on Dec. 19 before the Michigan Public Utilities Commission on the petition of the Detroit United Railway to increase its bus fares between Detroit and Mount Clemens and Detroit and Pontiac. The decision in favor of a temporary increase was reached when the hearing was resumed on Nov. 20 and higher fares became effective Dec. 1. This increase to 1½ cents a mile was referred to in the ELECTRIC RAILWAY JOURNAL of Dec. 6. The 2-cents-a-mile rate which was to be put into effect by the Detroit United Railway on Dec. 17 has been suspended pending the commission's investigation. The 1½-cent rate superseded the former 1-cent-a-mile rate.

**Subway Movement to Be Pushed.**—The Civic Council on Rapid Transit, a citizens' committee to sponsor the movement for a subway and rapid transit for St. Louis, Mo., has been organized by representatives of fifteen civic and business organizations of the city. Orman J. McCawley, chairman of the Rapid Transit Committee of the Civitan Club, which began the subway movement last spring, has been named chairman. A committee of Aldermen has recommended an expenditure of $100,000,000 for a subway system in the downtown district, the bonds to be paid off over a period of 50 years from the revenue from the subway.

**Seeks Higher Fare.**—The Beloit Traction Company, Beloit, Wis., has petitioned the Wisconsin Railroad Commission to increase its fares from 5 cents to 7 cents and from 4 to 6 cents where tickets are involved. No increase, however, is asked in the present 2-cent fare the school children of the city are obliged to pay. Last year the system was able to earn a return of only 2 per cent on the investment.

**Breaks Into Print on Fifth Anniversary.**—"Ore Line News," published by the employees of the Northeast Oklahoma Railroad, Miami, Okla., made its first appearance under date of December "as a medium of exchange of ideas of benefit to each other and for distribution to the public of information thought to be of interest." The initial number recounts interesting events in the company's departments, camp and hospital associations, together with some traffic and track statistics of the company during its five years of operation.

**Franchise Rights Extended.**—The Southwestern Traction Company has retained its franchise rights to operate on the streets of Dallas if it builds an interurban line to Irving by Aug. 31, 1925, the City Commission decided recently. The ordinance renews many of the rights granted in 1906 to J. Mercer Carter and associates when a system not only to Irving, but to Cleburne and other points in Central Texas was contemplated. The franchises have passed to E. P. Turner and associates, now known as the Southwestern Traction Company. Under the franchise granted Dec. 1 the Southwestern Traction Company has the right to lay its own tracks west of Houston Street and to go over the Union Terminal tracks and the Trinity River with a viaduct of its own. The company cannot lay tracks on the Commerce Street bridge. As a bonus for the franchise Mr. Turner and associates are to pay the city $100 a year. The franchise runs for a period of twenty years.

**Fare Proposals Submitted.**—Negotiations between the Council of Quincy, Ill., and the Illinois Power & Light Corporation, operating the Quincy traction system, are proceeding on two fare proposals recently submitted by Ralph Carley, western division manager. A 10-cent cash fare, 7 checks for 50 cents or a monthly commutation ticket at 50 cents to reduce the fare for frequent users is the first plan, with four checks for 25 cents and a cash fare of 10 cents as the alternative. School children's fares remain at 5 cents in both plans.

**Rates Approved.**—The Public Service Commission has approved rates for the Syracuse Railway Co-ordinated Bus Lines, Inc., on its new line known as Colvin Street Bus Line, operated in city of Syracuse, N. Y. A fare of 7 cents per capita or valid transfer issued by New York State Railways will apply for transportation of adult passengers between any two points on the bus lines.

**Prefers Lower Fare with Loss of Line.**—The 5-cent fare with free transfers will remain in effect on the local lines of the International Railway in Niagara Falls, N. Y., under a decision of the Public Service Commission. The company is, however, authorized to abandon its Sugar Street line because receipts do not meet operating expenses. The line is 2 miles long and covers the northeast section of the city. The commission gave the city of Niagara Falls the option of allowing the International to continue the Sugar Street line at an increase in fare on all lines or abondoning this one line and keeping the fare undisturbed. The city accepted the abandonment plan. It is expected that the company will now proceed with the work of removing the tracks and poles.

# Foreign News

## Royal Commission Inspecting the Tramways in Australia

A Royal commission of experts is investigating the railways and tramways of Australia and New Zealand. The commission consists of Sir Sam Fay and Sir Vincent Raven, with Charles Travis, as secretary, all of London. Sir Sam Fay was for 20 years general manager of the Great Central Railway and during the latter part of the war held the important position of director-general of movements of railways at the War Office. He was president of the Institute of Transport for the year 1922-23 and is a director of the Buenos Aires Western and Buenos Aires Great Southern Railways. Sir Vincent Raven was chief mechanical engineer to the North Eastern Railways for a period of 12 years and during the early part of the war was chief superintendent of the arsenal factories at Woolwich, and later became controller of the armament production at the Admiralty. Mr. Travis is associate editor of the British *Railway Gazette* and editor of the *Railway Engineer*.

## Swiss Railway Development Plans for 1925

The budget of the Swiss Federal Railways, Berne, Switzerland, for 1925 provides for the expenditure of 51,433,140 francs for electrification work, 25,060,000 francs for additional electric locomotives and motor coaches and 2,000,000 francs for installation of electric heating appliances in the passenger rolling stock. Included in the proposed work is a new line making direct connection between the Havenstein line and the Aara line, for which 1,190,000 francs was appropriated. New estimates are to be prepared for a new line in the Surbtal district. This line was first proposed in 1920.

There are at present 382 miles of electrified lines of the Swiss Federal Railways and work will soon be completed on the Zurich-Olden line, 40 miles; the Olsten-Berne section, 37½ miles; the Zurich-Winterthur line via Wallisellen and Kloten, 25½ miles; the Zurich-Rapperswill line, 22½ miles; the Lausanne-Vallorbe-Yverdon line, 40 miles, and the Palezieux-Lausanne and Renens-Geneva sections, 45½ miles.

A contract has been made with the Bernische Kraftwerk Gesellschaft for the supply of current for the lines already electrified and those to be electrified. The contract is for 20 years and will mean a saving of 11 per cent over the present cost of current. Plans were approved for the construction of substations at Kersers, Rupperswil and Rudoux, 9,615,000 francs having been appropriated for the work.

The Swiss Federal Railways now has in use 227 single-phase electric locomotives and motor coaches, exclusive of those on the Seethal line. It is thought that 304 will be required by the end of 1926.

**L. C. C. to Use Sorbitic Rails.**—The London County Council has arranged for 200 tons of tramway rails to be treated by the Sandberg sorbitic process, at a cost not to exceed £360. This process has been extensively used in Great Britain with great success. A description of the use of sorbitic rails in Boston was published in this paper for July 26, 1924.

# Financial and Corporate

## Final Moves Being Made

### Reorganization Plan for St. Louis System Enters Upon the Final Stages Before Court and Commission

The reorganization plan for the United Railways, St. Louis, Mo., will be presented informally to the Missouri Public Service Commission in the near future for approval. The plan has already been submitted to Federal Judge Faris for his information and informal approval. This was disclosed recently when the court denied a group of attorneys representing holders of judgments against the United Railways the right to intervene in the foreclosure action against the railway. The court took this position when counsel gave assurance that all of the judgments against the company were to be in full with interest in the reorganization plan. Judge Faris stated that the move was premature and that when the time came for such action the petition could be filed.

The court will be asked to decide whether the reorganization committee must pay off the $4,100,000 of underlying bonds to cure the default in the $30,300,000 issue of general 4 per cent bonds of the United Railways or extend the underlying bonds. This phase of the reorganization is the only one that has not been finally agreed upon. The tentative plans call for the paying off of the underlying bonds at this time, but if the court holds that the bond can be extended it would furnish the reorganization committee that much more working capital at this time.

#### $14,195,512 IN CASH

Attorneys for the reorganization committee have advised that the underlying bonds may be extended legally, but attorneys for the bondholders' committee have taken the position that the bonds must be paid off to cure the default in the general bond issue which occurred when the company was unable to take up the underlying bonds at their original maturity dates.

The reorganized company will raise funds through the issuance of $6,000,000 in new bonds to be sold at 90, thus netting $5,400,000, and through the sale of 343,645 shares of common stock to present holders of preferred stock, transit bonds and common stock at $12.50 a share, netting $4,295,562. It is expected that the cash in the hands of Receiver Rolla Wells will be $4,500,000 when the receivership terminates. This would give the new company a total of $14,195,512 cash, which could be used to pay off the $4,200,000 in receiver's certificates, $2,000,000 Suburban bonds and possibly the $4,100,000 of underlying bonds.

It is planned to ask the Missouri Public Service Commission for authority to earn 7 per cent on a valuation of $57,200,000, or $4,004,000. That would enable the company to meet all of its fixed charges and begin immediately to pay dividends on the preferred, with a remainder left over to apply to the common stock.

The plan for the reorganization of the United Railways, St. Louis, Mo., to which reference has been made in recent issues of the ELECTRIC RAILWAY JOURNAL, contemplates the organization of two companies to succeed to all the properties of the system, one of which, for the present, is termed the new company, and the other, the new Suburban subsidiary. The new company is to issue $6,000,000 of new collateral notes or first and refunding mortgage bonds, probably bearing interest at 6½ per cent; 53,845 shares, probably no par value, $7 dividend cumulative preferred stock and 343,645 shares of no par value common stock. The new Suburban company will issue $4,500,000 first mortgage 5 per cent bonds.

#### NEW BONDS AND STOCKS TO BE SOLD

Of these securities, $6,000,000 new company bonds are to be sold at about 90 and the 343,645 shares of new, common stock are to be disposed of at $12.50 per share. It is estimated that treasury cash will amount to about $4,500,000, so that a total of about $14,195,562 cash will be available for the purposes of the plan. This money is to be used in the payment of the receiver's certificates, for the retirement of $1,640,000 Cass Avenue & Fair Grounds Railway first 5 per cent bonds, $986,000 Compton Heights, Union Depot & Merchants' Terminal Railroad first 6s and $1,474,000 Lindell Railway first 5s, now 8 per cents, all at par. These issues matured by their terms during the receivership.

There will also be funds for the payment at par of $2,000,000 St. Louis & Suburban Railway first mortgage 5s, now 8s, and for payment on account of $2,937,000 in respect to $9,790,000 now outstanding St. Louis Transit Company improvement bonds, due Oct. 1 of this year. After these payments have been provided for it is expected that nearly $900,000 will remain for the expenses of the reorganization and working capital for the new company. The $4,500,000 of bonds of the new Suburban company are to be issued in exchange, par for par, for St. Louis Suburban Company general mortgage 5s, which matured April 17, 1923.

There will still remain outstanding $30,300,000 United Railways first general mortgage 4 per cent bonds, dated July 1, 1889, due July 1, 1934, of which $42,000,000 were originally authorized, $32,231,000 issued and $1,931,000 canceled. These bonds remain as the senior lien of the new system. The only bonds, therefore, materially affected by the plan are the St. Louis Transit improvement 5s, each $1,000 of which is to receive five and one-half shares of new $7 dividend preferred stock and $300 in cash. Both preferred and common stocks of the old company are eliminated except that the owners of the same will have certain rights to subscribe to the common stock of the new company at $12.50 per share.

A letter addressed by the receiver to the reorganization managers states that in about five and one-half years of the receivership a total of $5,125,517 has been expended on the railway, its equipment and power facilities, of which sum $4,498,598 is net addition to the capital plant. In the same time, $20,145,235 was expended for maintenance and replacements.

Under date of Oct. 1 Rolla Wells, receiver of the company, reported to Frank O. Watts, chairman of the reorganization committee, on the earnings of the company for the twelve months ended Dec. 31, 1923, and the eight months Jan. 1, 1924, to Aug. 31, 1924. These figures follow:

| | Year Ended Dec. 31, 1923 | Eight Months Jan. 1 to Aug. 31, 1924 |
|---|---|---|
| Gross operating revenue | $20,453,445 | $13,124,895 |
| Operating expenses (including reserves and taxes) | 16,955,786 | 11,362,136 |
| Income from operation | $3,497,659 | $1,762,759 |
| Non-operating income | 225,700 | 182,641 |
| Gross income | $3,723,359 | *$1,945,400 |
| Interest and miscellaneous charges | 2,913,614 | 1,902,528 |
| Surplus | $809,745 | $42,872 |

* It is estimated that for the year 1924, based on 10 months actual results, this gross income will amount to $2,954,850.

The United Railways, then known as Central Traction Company, was formed in 1898 as a consolidation of about thirty existing companies up to that time operating more or less independently. As a result of the assumption of securities then existing, the issuance of additional bonds at about the time of the consolidation and subsequently, this railway system of now approximately 483 track miles has a capitalization of $91,986,000, of which $50,690,000 was interest-bearing indebtedness, represented by bonds of various kinds requiring $2,361,980 yearly for interest alone. In addition, the company borrowed as a short-term accommodation from the War Finance Corporation $3,235,000, the inability to repay which, so it is stated, in 1919 was the direct cause of the appointment of the receiver.

## Holders of Chicago Securities Willing

Bankers who represent the holders of approximately $100,000,000 of securities of the various properties comprising the Chicago Surface Lines have promised the city of Chicago to accept the city's notes in exchange for Surface Lines securities in the event of a municipalization of the lines. All they ask is protection in the management of the lines and other safeguards during the life of the notes.

For more than three weeks quiet accumulation of the underlying bonds of the Surface Lines companies has been in progress. Additional activity resulted from the city's acquiescence to the traction bankers' ultimatum for a price based upon capital account value, $162,000,000, or appraisal. Inasmuch as experts declare the appraisal of the Surface Lines will exceed the $162,000,000, it was said that would be the figure paid.

## Yonkers Railroad Lost $350,000, Commission Told

Evidence of losses for 1923 and the first six months of 1924 totaling more than $350,760 on the five trolley lines it seeks to abandon in Yonkers was submitted to the Public Service Commission at the second hearing held in Yonkers Nov. 21 on the petition of the Yonkers Railroad, a subsidiary of the Third Avenue Railway of New York, for abandonment. Public Service Commissioner Oliver C. Semple conducted the hearing, which was adjourned until some time in December.

The gross receipts for the fiscal year ended September, 1924, were $1,285,823. In 1918 the gross receipts approximated $824,000. Since that year, moreover, there have been three wage increases. E. M. T. Ryder, civil engineer in charge of the track repairs for the Yonkers Railroad, estimated that the cost of replacing ties and executing general reconstruction on various parts of the five lines under discussion would total approximately $174,200. With no tracks to repair on these routes a saving of $25,000 a month would result.

Definite assurance that the company was willing and prepared to substitute bus service in place of the five trolley routes was given by railway officials, who declared that the operating costs of their roads had increased since 1918 and that the 1919 peak prices for materials had not been reduced.

## Successor Officers Named

The personnel of the Winona Service Company, Warsaw, Ind., incorporated several months ago to operate the line formerly known as the Winona Interurban Railway, is as follows: President, Harry Reid; vice-president, Theodore C. Frazer; secretary and treasurer, J. P. Goodrich; auditor, J. R. Steinebach; in charge of operation, F. L. Oppenheimer; roadmaster, C. L. Reese; master mechanic, C. F. Sigler; line foreman, O. R. Ferguson; safety director, James Harmon; purchasing agent, W. S. Campbell; traffic manager, J. O. Motto, and chief electrical engineer, C. C. Argalite.

## All Preferred Stock of New Orleans Property Sold

Every car of the New Orleans Public Service, Inc., comprising the entire parish of Orleans, bore the following announcement on Dec. 2:

ALL SOLD

All the preferred stock we have to offer at this time has been sold. Thousands of our customers and employees are now stockholders in this company. We appreciate this expression of confidence. THANKS.
NEW ORLEANS PUBLIC SERVICE, INC.

This announcement concluded the advertising campaign for the sale of preferred stock of the company started some time ago. More than 15,000 shares of stock were sold to 5,200 individuals. The clerical forces of the company, conductors and motormen, the trackmen and other employees of the transportation and maintenance of way departments of the system all enlisted as salesmen.

In referring to the gratifying results and the encouragement given the company by the public of New Orleans H. B. Flowers, president of the company, disclosed that an Eastern investment banking house had purchased for distribution among its investors a substantial block of the stock, absorbing all of the preferred stock now available.

## Beaver Valley Company Abandons Two Miles—Coaches Substituted

The Beaver Valley Traction Company, New Brighton, Pa., has abandoned, with the common consent of two different towns, a division of its property 2.5 miles long, replacing the service with motor coaches. The line abandoned connected the towns of New Brighton and Beaver Falls and traversed sections of the towns different from those covered by the trunk line of the company.

The railway line did not pay. Lack of revenue prevented the company from keeping up its maintenance. To rehabilitate the property would have involved an expenditure of $125,000. When the two boroughs decided to improve the streets over which the line operated the question of abandonment arose. The two towns requested the railway to repair its pavement and fulfill the franchise requirements. This proposal was met by the request that the two towns resurface over the tracks of the railway and permit operation of coaches instead.

In obtaining the approval of the Public Service Commission for the abandonment of the railway and the right to operate coaches, C. D. Smith, general manager, was able to have the borough representatives appear before the commission as witnesses for the company. No protests were filed. One section of the agreement made with the borough describing the rights still held by the traction company states that the agreement shall be in effect for 49 years with the right reserved to the railway at any time previous to the end of the term to reconstruct the railway tracks.

It is provided, however, that in such event the traction company or its successors so reconstructing the tracks shall bear the entire cost of repaving between the rails and 18 in. outside.

Another section stated that the Borough of Beaver Falls shall not grant to any other company or individual the use of the streets covered by the contract for railway purposes.

The coach line is now being operated over the resurfaced streets and is giving more service than the former single-track railway line. This operation is by the Beaver Valley Motor Coach Company, a subsidiary of the Traction Company, under the management of C. D. Smith. A 10-cent cash fare prevails, with a ticket rate of seven for 50 cents, instead of the previous 5-cent fare which existed on the car line. The coach line is earning 30 cents per mile. The railway earned 23 cents per mile.

This is only one of the three coach lines being operated under the supervision of Mr. Smith in the territory covered by the Beaver Valley Traction Company. One of the other lines is operated from the terminal of the Pittsburg & Beaver Street Railway at Leetsdal through the Boroughs of Edgeworth Shields, Quaker Valley and Sewickley making connections with cars of th Pittsburgh Railways at the Sewickle Bridge. The third line is that operate between Rochester and Colona, acro the Ohio River Bridge from Rochest into the Borough of Monaca, parallelin the tracks of the Beaver Valley Tra tion Company to the end of the line an then continuing on to Colona, a distanc of 0.875 mile.

Pierce-Arrow coaches are being ru They are equipped with bodies made b the E. J. Thompson Body Company Pittsburgh. Each seats 24 passenger

The railway did not feel that it wa warranted in risking the $125,000 fo improvements and still face possibl further unprofitable operation of th railway. As compared with this ex penditure the bus installation is est mated to have cost $21,000. After thre months operation the gross earnings o the bus line are 30 per cent greate than the earnings of the railway for similar average comparable period.

## Six-Mile Vermont Road Discontinued

The Bellows Falls & Saxtons Rive Street Railway, Bellows Falls, Vt., op erating 6 miles of electric railway in town of 5 000 inhabitants, has been dis continued. A year ago the carhouse an most of the rolling stock were destroye by fire and although the equipment wa replaced and the service maintaine the company was dealt a financia reverse that has added to its diffi culties. E. A. Pierce, former superin tendent, is running a taxi service t carry mail and passenger service. N special provision has been made fo the large freight service that was don by the railway. At a public meetin on Dec. 5 business men and citizens o Saxtons River were recorded as op posed to the establishment of a bu line, and for the present will rely o the taxis and on independent, pri vately conducted facilities for handlin freight. The road was built by C W. Blakeslee & Brother, New Haven and members of that family have bee the principal owners. It was opened for service on June 13, 1900.

## Trenton and Philadelphia Companies Merge

The Trenton, Bristol & Philadelphia Street Railway, the Pennsylvania & New Jersey Street Railway and the Philadelphia, Frankford & Tacony Traction Company, Philadelphia, Pa., have been consolidated. The company intends to rebuild a goodly portion of the roadway between Trenton and Bristol and purchase new cars with the intention of establishing express service between Trenton, N. J., and the elevated railway of the Philadelphia Rapid Transit Company at Frankford. The purchase by the Bristol company takes all the franchise rights the Pennsylvania & New Jersey now has in Pennsylvania, including the Morrisville and Yardley lines, and also the terminal privileges of the Trenton & Princeton Traction Company at Trenton, N. J.

**Preferred Stock Offered.**—The Old Colony Trust Company, Boston, and Bonbright & Company, New York, are offering at $97 a share and accrued dividends to yield more than 7.20 per cent 22,000 shares of cumulative preferred stock (no par value) of the New Orleans Public Service, Inc., New Orleans, La. The company owns and operates properties formerly owned and controlled by the New Orleans Railway & Light Company. These include 222 miles of electric railway. The value of the property as recognized by the city of New Orleans for rate-making purposes, including expenditures for additions and improvements to Oct. 31, 1924, is about $59,500,000.

**Bonds Offered.**—A syndicate, headed by Estabrook & Company, Boston, is offering at 92 and interest to yield 5.55 per cent $2,000,000 of first and refunding mortgage 5 per cent gold bonds of the Columbus Electric & Power Company, Columbus, Ga. The bonds known as Series B, are dated Nov. 1, 1924, and are due Nov. 1, 1954. The proceeds from this series will provide a portion of the fund for new hydro-electric development at Bartlett's Ferry, now in the course of construction.

**Dividend Increased by Public Service Corporation of New Jersey.**—Directors of the Public Service Corporation of New Jersey at their meeting on Dec. 2 increased the dividend rate on the no par common stock from $4 to $5 by declaring a quarterly dividend. Thomas N. McCarter, president of the corporation, in a statement following the meeting, said. "For ten months, this year the number of electric meters on our lines increased in round figures from 426,000 to 505,000, a gain of 79,000, and in the same period the number of gas meters in service jumped from 609,000 to nearly 638,000. There is a continued healthy demand for electricity and gas for industrial purposes, and the transportation situation is measurably better than it was a year ago."

**Stock Increased.**—A certificate has been filed in the office of the Secretary of State at Albany increasing the authorized capital stock of the Elmira Water, Light & Railroad Company, Elmira, N. Y., from $5,200,000 to $6,200,000.

**Increased Fare Does Not Reduce Patronage.**—Receipts of the Springfield Street Railway, Springfield, Mass., for November, show that there has been little reduction of patronage as a result of the increase of fares from 7 cents to 10 cents with three tickets for a quarter. Operating receipts for the month were $248,097, against $238,293 for the first thirty days of October and $241,565 for November, 1923. It is stated by General Manager H. M. Flanders that 91 per cent of the revenue for last month was derived from the sale of tickets at the three-for-a-quarter and zone rates and that the increased use of tickets has had a decided effect in speeding up traffic.

**Auction Sales in New York.**—At the public auction rooms of A. H. Muller & Sons there were sold this week $10,000 of Second Avenue Railroad, New York, N. Y., first mortgage 5 per cent bonds due February, 1948, 1908 and subsequent coupons attached, $100 lot.

**Approval of $2,000,000 Mortgage Sought.**—Approval of a corporation mortgage and immediate issuance of $2,000,000 of general mortgage bonds was asked in an application filed with the Illinois Commerce Commission at Springfield, on Nov. 29, by the Aurora, Elgin & Fox River Electric Company, Aurora, Ill. The company operates 75 miles of electric railway.

**Seeks Interest Share.**—The city of Seattle and the State of Washington have brought actions against King County in the Superior Court, seeking a share of the $254,261 interest on the 1919 street railway taxes recently paid the county by the Puget Sound Power & Light Company. The city contends its share is $113,725, while the state, through Attorney-General John H. Dunbar, asks for $38,213. County Treasurer W. W. Shields has stated that he will resist the action, maintaining that while both city and state were entitled to a share in the delinquent taxes, they had no title to interest.

**Petition for Abandonment Filed.**—The Public Service Commission held a hearing recently at New York City before Commissioner Semple on the application of the Northport Traction Company for consent to discontinue its 2.69-mile surface railroad at Northport, L. I. The road runs from the station of the Long Island Railroad to the village proper.

**Manhattan Payment Deferred.**—At the meeting of the directors of the Interborough Rapid Transit Company, New York, on Dec. 9, it was voted that the installment of Manhattan dividend rental, due on Jan. 1, 1925, be deferred. Under the terms of the Interborough-Manhattan readjustment plan of 1922 the amount of the quarterly installment of Manhattan dividend rental due on Jan. 1, 1925, is determined by the earnings for the three summer months ended Sept. 30, 1924. The earnings for that period, calculated as provided for in the plan, were not sufficient to warrant payment at the 5 per cent annual rate now applicable.

**Additional Appropriation Required.**—A final appropriation of $10,000, sufficient to carry on the work of valuing the properties of the Milwaukee Electric Railway & Light Company in connection with the proposed service-at-cost contract with the city, has been requested by the street railway acquisition committee. Previous appropriations have permitted an audit of the company's records up to 1921. This additional amount is needed so that the inspection of the books for 1922, 1923, 1924 will be completed by July, 1925.

**Merger to Proceed.**—The State Public Utilities Commission has refused to pass on an application for approval of the sale of the Tiffin & Fostoria Railway to the Toledo, Fostoria & Findlay Railway for $30,000. This is taken to mean an early merger of the two lines. The application was not acted upon by the commission on the ground that it lacks jurisdiction over the sale. Through Toledo-Tiffin service will be started by Jan. 1.

**Another Duluth-Superior Payment.**—The Duluth-Superior Traction Company, Duluth, Minn., has declared a dividend of $1 a share on the preferred stock, payable on Jan. 2 to holders of record Dec. 16. This is the same amount as had been paid quarterly for some time, with the exception of the payment due Oct. 1 which was passed.

**Mortgage Bonds Offered.**—A syndicate headed by Harris, Forbes & Company, New York, is offering at 95 and interest yielding more than 5.45 per cent $3,266,000 of first and refunding mortgage 5 per cent gold bonds of the Montreal Tramways, Montreal, Que., operating 270 miles of electric railway. The bonds are dated July 1, 1911, and are due July 1, 1941.

# Book Reviews

### Industrial Coal; Purchase, Delivery and Storage.

A report of the American Engineering Council. 419 pages. Ronald Press Company, New York, 1924. 419 pp.

This engineering survey of the possibilities of improving present methods of purchase, delivery and storage of coal was made at the request of the Federal Coal Commission and has been conducted with the co-operation of more than 400 engineers. The results are presented in 12 chapters, each signed by the author or authors, who took a prominent part in the study.

Briefly, the committee believes that seasonal storage of coal by consumers will overcome most of the difficulties now experienced, that sufficient storage will be obtained if each consumer annually purchases coal on a uniform monthly delivery basis, that such storage can be undertaken without serious risk or loss at a not very large expense and that this storage should take place at the point of use, or as near thereto as possible.

### Management's Handbook

By a staff of specialists, L. P. Alvord, editor-in-chief, Roland Press Company, New York. 1924. 1607 pp.

In view of the great progress made in recent years in administration and management engineering, there is undoubtedly a call for a handbook on the subject, and the one just published, the first to be compiled, well answers the requirements. There are 32 sections in the book, each written by one or two experts. Briefly, these sections are divisible in three groups. The first, including the first four sections, is devoted to general information of fundamental character. The 17 sections forming the second group deal with established management functions, methods and mechanism, while the third covers such basic information as economic principles underlying industry, organization, budgetary methods, cost accounting, etc. There is much in the book which will be found useful on an electric railway property, particularly in the shops and storerooms.

# Personal Items

## Earl Sipe Made Akron City Superintendent

Earl Sipe has recently been appointed superintendent of the Akron City railway system and the Akron-Barberton-Wadsworth Division of the Northern Ohio Traction & Light Company. Mr. Sipe takes the place made vacant by the promotion of O. L. Freeman to traffic engineer. John Flaherty has been acting as superintendent since Sept. 1. He will continue as assistant city superintendent, the position he held prior to the transfer of Mr. Freeman.

Mr. Sipe has been general foreman of the Kenmore shops since May 15, 1923. Prior to that time he was chief clerk to the superintendent of equipment in the shop. He began work with the company as train dispatcher at Silver Lake Junction on Sept. 15, 1918, coming from the Cleveland Southwestern. He has had much experience as a motorman, conductor, train dispatcher, shop worker and instructor of trainmen. He is thoroughly acquainted with the Akron City work, as well as with the balance of this system.

Mr. Sipe entered railway service in May, 1906, when he became a conductor on the city lines of the Mansfield Railway, Light & Power Company, in Mansfield, Ohio. He was then in his teens. In June, 1908, he secured a place as motorman on the Cleveland, Southwestern & Columbus Railway, running between Bucyrus and Cleveland.

Two years later Mr. Sipe went to the Illinois Traction Company, with headquarters in Decatur and Staunton, Ill., as train dispatcher. Three years later he went back to the Cleveland, Southwestern as train dispatcher at Mansfield. In the spring of 1916 he was appointed traveling motorman over the entire system. In this work he acquired a general knowledge of men and learned the value of proper instruction. The following year he was appointed as general foreman of the Elyria shops. In September, 1918, Mr. Sipe entered the service of the Northern Ohio Traction & Light Company, in train service and shop work.

---

**Blaine Gavett**, secretary of the American Public Utilities Company, Grand Rapids, Mich., recently sold to the Insull interests, has gone into the wholesale oil and coal business in that city. Associated with Mr. Gavett is Willis J. Ripley, formerly treasurer of the company.

**A. L. Linn, Jr.**, formerly vice-president and treasurer of the United Gas & Electric Corporation and the United Gas & Electric Engineering Corporation, New York, N. Y., has recently been elected president of the Colonial Gas & Electric Company, which has acquired the Newport Electric Corporation, Newport, R. I. The company at Newport operates the electric railway in Newport, Middletown, Portsmouth and Tiverton and generates electric current for light and power purposes in Newport, Middletown, Portsmouth and Jamestown, R. I. Mr. Linn is very well known in the electric railway field. He entered railway work in 1893 with the Cleveland Railway and later was for many years with the Utica & Mohawk Valley Railway and the New York State Railways.

**F. R. Smalley** has resigned as traffic manager of the San Diego Electric Railway, San Diego, Cal., to become general manager of the California Parlor Car Tours, Inc., with headquarters at San Francisco.

**Ralph F. Carley**, Quincy, has been named general manager of the western Illinois division of the Illinois Power & Light Corporation, with George F. Grote assistant manager. The headquarters are to be established in Galesburg, Ill., with the completion of the remodeling of the block at Kellogg and Simmons Streets. These men will direct business and operation of the interurban lines and local traction lines in the Quincy, Galva, Monmouth and Galesburg districts of the division.

**H. N. Wood** has been appointed commercial manager of the Pennsylvania-Ohio system, in charge of all sales and allied activities. He has held various positions with the system since 1914. Prior to that he was connected with the Westinghouse Electric & Manufacturing Company.

**F. R. Phillips**, mechanical and electrical engineer of the Pittsburgh Railways, Pittsburgh, Pa., was re-elected president of the Pennsylvania Street Railway Association at the meeting of the members of that association, in Harrisburg, on Dec. 5.

**R. Harland Horton**, vice-president of the International Railway, Buffalo, N. Y., in charge of traffic, has moved to Philadelphia and will be associated with the Philadelphia Rapid Transit Company, in special work. Herbert G. Tulley, president of the International, says that Mr. Horton will remain an officer of the Buffalo company.

**John Goguel** has been made roadmaster of the Fort Wayne & Decatur Traction Company, with office in Fort Wayne, Ind.

**J. W. Osborne**, formerly master mechanic of the Terre Haute, Indianapolis & Eastern Traction Company, is now superintendent of equipment with office in Lebanon, Ind.

**W. H. Fairbanks** has succeeded C. H. Parr as secretary of the Charles City Western Railway, Charles City, Iowa.

**E. A. Young** has succeeded C. C. Coan as treasurer of the Clinton Street Railway, Clinton, Iowa.

**L. B. Andrus** has succeeded Joseph H. Brewer as president of the Northern Indiana Power Company, Kokomo, Ind. Fred Olvey has succeeded L. C. Fitzsimmons as chief engineer of the power station.

**J. N. Campbell** has succeeded Edward Heydon as superintendent of overhead construction of the Indianapolis Street Railway, Indianapolis, Ind.

**G. Rake** has been appointed general foreman of the Kenmore shops of the Northern Ohio Traction & Light Company, Akron, Ohio, to succeed Earl Sipe recently appointed superintendent of the Akron city lines. Mr. Rake has been connected with the company for several years.

**P. L. Gray** has replaced R. A. Crew as auditor of the Southern Illinois Railway & Power Company, Harrisburg, Ill. R. B. Tulpin is now the secretary. He succeeds P. A. Erlach.

**O. L. Frazee** has replaced J. F. Gannon as master mechanic of the Gary Street Railway, Gary & Hobart Traction Company and the Gary & Valparaiso Railway, Gary, Ind.

**H. L. Bennett**, formerly secretary and auditor of the Vincennes Electric Railway, Vincennes, Ind., is now in charge of operation and is fulfilling the duties of secretary and treasurer.

**A. R. Horr** is now secretary of the Chicago, Lake Shore & South Bend Railway, Michigan City, Ind. He succeeds R. R. Alexander, who performed the duties of secretary and treasurer.

**H. C. Mackay**, formerly secretary, treasurer and auditor of the Evanston Railway, Evanston, Ill., has been made vice-president, but will continue to serve as secretary. Charles F. Speer, vice-president in charge of operation, will perform the duties of treasurer. The transportation department is in charge of J. M. Sills.

# Obituary

## August Belmont

August Belmont, chairman of the board of the Interborough Rapid Transit Company, New York, financier and sportsman, died at 6:30 p.m. on Dec. 1 in his apartment in New York, less than thirty-six hours after he had been taken ill in his office. Mr. Belmont was 71 years old.

The directors of the company, as a mark of respect for the memory of Mr. Belmont, directed that at 4 o'clock on the afternoon of his funeral, Friday, Dec. 12, all movements of trains be stopped for a period of one minute. In addition the secretary was requested to prepare an appropriate memorial to be submitted at the next meeting for entry upon the minutes expressing the sympathy and profound regret of the directors and recording their recognition of his accomplishments, personal charm and integrity.

One of the outstanding achievements of Mr. Belmont was the financing of the first New York subway. Mr. Belmont had generally received a large share of the credit for the successful completion of the enterprise but no more credit than is properly due to him. Others hesitated, skeptical of the outcome, but Mr. Belmont went ahead. Then when the correctness of his judgment had been proved it was sought to jockey him out of his advantageous position.

Mr. Belmont obtained the contract

r the building of the original subway d a lease of the property for 50 ars, with a 25-year renewal. When started to build the subway the hitney group began to make war on n for control of the transit situation New York. Thomas F. Ryan was e principal member of the Whitney oup, and a battle to the finish ensued tween Belmont and Ryan. The ulds, who controlled the Manhattan ilway, elevated lines, also waged war Belmont. Mr. Belmont finally leased e Manhattan for 999 years.

Belmont and Ryan eventually ar- nged for a merger of their traction terests. This resulted in the organ- ation of the Interborough-Metropoli- n Corporation, an incongruous finan- l structure which has since passed t of the traction picture and which any at the time felt was ill con- ived.

Mr. Belmont was jealous of the good me of the Interborough Rapid Tran- t Company. Some years ago he said:

The Interborough is the only company my experience that can claim the dis- ction of doing any serious service for improvement of traffic conditions in eater New York, in spite of the abuse has received. The treatment of this company has not been such as to inspire further effort on the part of private enterprise, and until private enterprise is encouraged and confidence restored we won't have any improvement. You can split the present system into its original component parts, but you won't have five feet additional service added to the system.

The transportation problem must be treated from the standpoint of a reasonable return on the money invested, whether it be the city's or private money. You can't treat it on an ideal basis.

Mr. Belmont was educated at the Rectory School, Hamden, Conn., at Exeter Academy, at Haverford College and at Harvard College. He was graduated from Harvard in the class of 1874. He entered his father's banking house in September, 1875, the year after his graduation from college. Mr. Belmont learned the business from the ground up, and after his father's death in 1890 became the head of the house.

---

**William Harris**, vice-president of the Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y., died on Nov. 29 at Northville. He had been interested in this property since its construction, and was a member of the board of directors for many years. Mr. Harris was 76 years old.

# Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

## Vages Up 100 per Cent Over 1914

Wages, as measured by average ourly earnings, have made a net gain more than 100 per cent in the last years, while the average of the cost living has made a net advance of out 60 per cent. These figures are ntained in a survey made a short me ago by the National Industrial onference Board.

In September, 1924, the cost of living dex number determined by the board ood 63.7 per cent above the level of ly, 1914, as compared with 63.4 per nt in September, 1923. During the ar ended September, 1924, hourly rnings of all wage earners remained ractically constant. There was, there- re, no considerable change in "real" ourly earnings during the year.

The highest point reached, during the n years reviewed, by the index num- r of "real" hourly earnings based on nditions in July, 1914, as 100, was 2, and the lowest point 139. In Sep- mber, 1924, it stood at 141.

The substantial increase in actual eekly earnings between August and eptember of this year advanced the dex number of "real" weekly earn- gs to 126 for the month in spite of e fact that the cost of living index umber had also advanced nearly a oint. Translated into other terms it eans that in September, 1924, the ntents of the average employed wage rner's pay envelope would purchase per cent more of the necessaries of fe than in July, 1914.

In referring to the industrial depres- on from which the country is now definitely emerging, the board expresses the opinion that the fear of the wage earner that a lower wage scale introduced as a temporary expedient may become a permanent level is not justified by facts. The wage reductions of 1920 and 1921 paved the way for and hastened the recovery of 1922-23, which was responsible in the early months of 1923 for the very general wage increases.

The report, which comprises the fullest data up to the end of September, 1924, concludes that employment, earnings and hours of work all registering substantial gains at a time of the year when manufacturing activity is usually low may be regarded as reliable evidence that the long anticipated upward turn has begun and that in spite of temporary reactions industry may reasonably soon look forward to a more satisfactory period of operating conditions.

## Metal, Coal and Material Prices

| Metals—New York | Dec. 9, 1924 |
|---|---|
| Copper, electrolytic, cents per lb | 14.25 |
| Copper wire base, cents per lb | 16.875 |
| Lead, cents per lb | 8.90 |
| Zinc, cents per lb | 7.45 |
| Tin, Straits, cents per lb | 55.00 |
| **Bituminous Coal f.o.b. Mines** | |
| Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons | $4.125 |
| Somerset mine run, Boston, net tons | 2.15 |
| Pittsburgh mine run, Pittsburgh, net tons | 1.875 |
| Franklin, Ill., screenings, Chicago, net tons | 1.50 |
| Central, Ill., screenings, Chicago, net tons | 1.35 |
| Kansas screenings, Kansas City, net tons | 2.15 |
| **Materials** | |
| Rubber-covered wire, N. Y., No. 14, per 1,000 ft | $6.65 |
| Weatherproof wire base, N.Y., cents per lb. | 17.75 |
| Cement, Chicago net prices, without bags | 2.20 |
| Linseed oil (5-lb. lots), N. Y., per gal | $1.14 |
| White lead in oil (100-lb. keg), N. Y., cents per lb., carload lots | 0.152 |
| Turpentine (bbl. lots), N. Y., per gal | 0.84 |

## Large Lubrication Contract Renewed

The Texas Company, producers of Texaco petroleum products, has renewed its contract with the Brooklyn-Manhattan Transit Corporation and the New York Rapid Transit Corporation. The contract calls for Texaco oils to lubricate the entire rolling equipment of these two great metropolitan transit organizations.

## Commerce Body Defends Trade Associations

The position of American business on important current national economic questions was recently put before President Coolidge by the Chamber of Commerce of the United States in a statement setting out principles upon which the chamber lays emphasis as especially timely. In each instance the chamber's proposals are the result of action by the organization's membership. The subjects dealt with include: Repeal of income tax publicity; creation of a national tax commission; declaration of a policy regarding trade associations; the establishment and carrying out of a merchant marine policy; development of waterways; the Railroad Labor Board; the setting up of an immigration commission, to recommend and administer legislation; extension of the budget system.

The chamber thoroughly believes that trade associations, legitimately conducted, are an essential element to the promotion of American business and that legislation which would make them impossible, or make it impossible for them to function properly, would hinder not only industry but also the prosperity of the nation. It is felt that organizations and individuals against whom no accusation under existing law has been brought or is in contemplation are subjected to the injustice of being viewed with suspicion by the public.

The chamber holds no brief for trade associations that infringe the law, but seeks to point out the facts so as to remedy a situation which is already tending to hinder the development of business. The larger and richer the corporation, the less its needs for a trade association. Not so with the smaller concerns. They cannot afford, except through pooling their interests, to secure business data. The membership of the chamber, through a referendum vote, has made the following recommendations regarding the use of statistics by trade associations:

Statistics of capacity, production, stock and sales, and statistics of actual prices in closed transactions, should be collected by a trade association for its industry or branch of commerce.

Such statistics should be distributed without any comment or interpretation which could induce or facilitate concerted action on the part of members.

The statistics should be made as available by a trade association to the public and government agencies as to the members of the association.

## Rolling Stock

**Jacksonville Traction Company, Jacksonville, Fla.,** is negotiating for the purchase of two additional cars.

**Gary & Valparaiso Railway, Gary, Ind.,** has plans under way for the purchase of two new combination passenger baggage and smoking cars at a cost of $40,000.

**Kewanee Public Service Company, Kewanee, Ill.,** has purchased 12 new cars of the Birney safety type.

**Trenton & Mercer County Traction Company, Trenton, N. J.,** has placed 10 new cars in operation and has ordered 10 more. These cars cost $13,000 each. It is intended to operate them with one man.

**Trenton, Bristol & Philadelphia Street Railway—Pennsylvania & New Jersey Street Railway, Philadelphia, Frankford & Tacony Traction Company.—Philadelphia, Pa.,** recently amalgamated, plans to purchase new cars.

**Shreveport Railways, Shreveport, La.,** has just placed in service three new cars built by the American Car Company, St. Louis. These are double-truck, single-end, front-entrance, center-exit, one-man, two-man type. The length over all is 40 ft. 9 in. The total weight is approximately 30,000 lb. When arranged for one-man operation the car will seat 55 passengers, but when operated by two men the seating capacity is only 47.

## Track and Line

**Miami Beach Electric Company, Miami Beach, Fla.,** has started work on new tracks which are to be constructed on Washington Avenue, Biscayne Avenue, Ocean Drive and First Street.

**Iowa Railway & Light Company, Cedar Rapids, Iowa,** has completed a loop in Des Moines which will give a number of towns it serves duplicate service. The loop as completed extends from Boone west to Grand Junction, south to Perry, east to Madrid and north to Boone.

**Cleveland Railway, Cleveland, Ohio,** has filed plans for the erection of a one-story brick and steel substation at 1004 Central Avenue, to cost $45,000.

**Chicago Surface Lines, Chicago, Ill.,** opened up two extensions recently aggregating about 1 mile. The West Seventy-first Street line was extended from South Western Avenue to California Avenue, making an additional route to Marquette Park. The Western Avenue line was extended from Seventy-first to Seventy-fifth Street with the expectation that it will subsequently extend several miles south into territory now developing.

**Johnstown Traction Company, Johnstown, Pa.,** has completed its 1924 program of track renewals and street improvements at a cost of $239,520. This is the fifth year during which extensive work of this kind has been done by the company. Since the beginning of 1920 more than $850,000 has been spent for street improvements by the railway. The program will be continued next year, but definite plans have not yet been formulated for this work.

**Georgia Railway & Power Company, Atlanta, Ga.,** is putting the finishing touches on a number of paving and track rebuilding projects before the close of the current year. One of the major projects recently on Fair Street necessitated rebuilding the entire roadway area, including the laying of heavier tracks and repaving of the street. A new type of work in which steel cross-ties were used was completed recently on Highland Avenue. Double tracks were installed on Pryor Street and Georgia Avenue and the rebuilding work on Kelly Street was completed. The laying of double track and the construction of a left-hand branch-off at Whitehall and Cooper Streets and the installation of two new crossings at Georgia Avenue and Washington Street are other jobs which have been completed, also the improvement program begun some weeks ago on Broad Street.

## New Incorporation

**St. Louis-Kansas City Short Line Railroad, St. Louis, Mo.,** has been incorporated. The articles provide for an authorized capitalization of $2,400,000, of which $240,000 has been subscribed. The incorporators are Lee Dunlap and Frank E. Lott, Kansas City, Mo., and Ernest H. Lawhon, Erba D. Smith and William H. White all of St. Joseph, Mo. Mr. Dunlap has stated a standard gage electric railroad is planned, but the company is authorized to use steam, electricity or other motive power. The line would run from St. Louis through Creve Cœur, St. Charles, Warrenton, Jonesboro, New Florence, Columbia and New Franklin, crossing the Missouri River at Arrow Rock and proceed thence through Marshall, Higginsville and Independence to Kansas City. The projected road, 238 miles long, would take 35 miles off the rail mileage between the two terminal cities.

## Trade Notes

**Economy Electric Devices Company, Chicago, Ill.,** is calling attention in a special letter to the aluminum coil which it exhibited at the Atlantic City convention. That coil was subjected to the most severe tests possible. A bare aluminum coil, oxidized by the company's usual process, was mounted on a transformer growler. Under one end of this coil was an alcohol lamp. The other end of the coil was kept saturated with water. A vise in the middle of the coil subjected it to pressure far in excess of any pressure a coil would have to withstand in service. The coil was clear of shorts even with one end soaking wet, the other end sizzling hot, and under pressure sufficient actually to deform the wire. Intentional shorts made on the coil would promptly clear themselves by the passage of the current. In the Economy aluminum field coils aluminum oxide is used as the insulator. A trial of the device is urged.

**Rail Welding & Bonding Company, Cleveland, Ohio,** announces the partial rearrangement of selling territories and the appointment of the following additional sales representatives: For the eastern Pennsylvania territory, Railway Track Work Company, 3132 E. Thompson Street, Philadelphia; for western Pennsylvania and northern West Virginia, Electrical Engineering & Manufacturing Company, 907 Penn Avenue, Pittsburgh, with branch offices in 330 Union Building, Cleveland, and 604 Mercantile Library Building, Cincinnati, Ohio; for the northern section of Illinois and for Wisconsin, Iowa and Minnesotta, R. Roy Holden, 310 South Michigan Avenue, Chicago; for Louisiana, Mississippi, Alabama, Florida, Georgia, eastern Tennessee, Texas and Oklahoma City, P. W. Wood, 1003 Carondelet Building, New Orleans, La.; for California, A. W. Arlin, 519 Delta Building, Los Angeles, and for the states of Washington and Oregon, Burton R. Stare Company, 619 Fourth Avenue, Seattle, Washington.

**Sullivan Machinery Company, Chicago, Ill.,** has removed its Cleveland office to Room 701, Rockefeller Building, from Room 824 in the same building. The district manager is Ralph T. Stone.

## New Advertising Literature

**General Electric Company, Schenectady, N. Y.,** is distributing a publication on lightning arrester grounds which is an elaboration of a paper by H. M. Towne, presented before the Southeastern Division of the N.E.L.A. at Tampa, Fla., on Nov. 20, 1923.

**Horne & Ebling Corporation, 50 Church Street, New York,** and factory in Jersey City, has listed in a four-page circular devices which it handles under the main heads: Motor and Controller Parts, Car Hardware, Line and Track Equipment, Specialties and Heat Treatment of Steel. Among the products of the company are brakes, malleable and brass castings, watertight crossing bells, junction boxes, case hardened pins, track sanders, car sash fixtures and trolley bases. The company is prepared to design and manufacture special railway devices.

**Atlas Lumnite Cement Company, New York, N. Y.,** has published a 30-page pamphlet in which Lumnite cement is described and its uses illustrated. Instances are reported where Lumnite has proved an advantage in concreting between and along tracks of various electric railways.

**Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.,** has released folder 4586, a single-phase road locomotive for preference freight service. This folder describes the new single-phase locomotive known as the Type L-5, which has recently been placed in service by the Pennsylvania Railroad, and a supplement to the folder describes the L-5-A, d.c. locomotive, which has also just been completed.

# When the trolley jumped—



Power off—Air gone—Car in darkness and speeding down grade at thirty miles per. Not a very comfortable situation for those aboard unless the Emergency Brake is positive in action.

*But*—there have been cases where the motorman struggled desperately with the hand brake and found it wouldn't work. In such cases it was generally found that some inadequate hand brake wound all the chain it could hold—then stuck before the brake shoes reached the wheels.

# What did the passengers think—

when the speed of the car was not retarded? Surely the motorman was doing all in his power to stop his car but inadequate hand brakes have a habit of sticking at just such a time.

That is why you should install Peacock Staffless Brakes instead of the kind that stick or are likely to.

Passengers' reliance for safety is in the motorman—and the motorman must depend on his brake. The finest motorman with inadequate brakes is helpless.

Peacock Staffless Brakes are always POSITIVE and no matter how much chain comes in, they'll wind it up and set the brakes with all the power necessary.

There will be no "frightened passengers" and "helpless motorman" with Peacock Brakes on the job.



## National Brake Company, Inc.

**Ellicott Square, Buffalo, N. Y.**

# Bankers and Engineers


**Ford, Bacon & Davis**
Incorporated
**Engineers**
115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

**The J. G. White Engineering Corporation**
Engineers—Constructors
Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads
43 Exchange Place New York

**STONE & WEBSTER**
Incorporated
EXAMINATIONS REPORTS APPRAISALS
ON
INDUSTRIAL AND PUBLIC SERVICE PROPERTIES
NEW YORK BOSTON CHICAGO

**THE BEELER ORGANIZATION**
ENGINEERS AND CONSULTANTS
Traction-Traffic-Equipment-Power
COORDINATION OF SERVICE—IMPROVED OPERATIONS
INCREASED TRAFFIC—FINANCIAL REPORTS
APPRAISALS—MANAGEMENT
52 Vanderbilt Ave. New York City

**SANDERSON & PORTER**
ENGINEERS
REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS
RAILWAY, LIGHT and POWER PROPERTIES
CHICAGO NEW YORK SAN FRANCISCO

**ENGELHARDT W. HOLST**
*Consulting Engineer*
Appraisals, Reports, Rates, Service Investigation, Studies on Financial and Physical Rehabilitation Reorganization, Operation, Management
683 Atlantic Ave., Boston, Mass.

**ALBERT S. RICHEY**
ELECTRIC RAILWAY ENGINEER
WORCESTER, MASSACHUSETTS
REPORTS - APPRAISALS - RATES - OPERATION - SERVICE

**JOE R. ONG**
Consulting Transportation Engineer
*Specializing in Traffic Problems and in Methods to Improve Service and Increase Efficiency of Operation*
PIQUA, OHIO

**STEVENS & WOOD, INC.**
Design and Construction of Power Stations
Railroad Electrification, Industrial Plants
REPORTS AND APPRAISALS
*Management and Financing of Utilities and Industrials*
Mahoning Bank Bldg. Youngstown, O.
120 Broadway New York

**Dwight P. Robinson & Company**
Incorporated
Design and Construction of
*Electric Railways, Shops, Power Stations*
125 East 46th Street, New York
Chicago Youngstown Atlanta Philadelphia
Los Angeles Montreal Rio de Janeiro

**HEMPHILL & WELLS**
CONSULTING ENGINEERS
Gardner F. Wells Albert W. Hemphill
*APPRAISALS*
INVESTIGATIONS COVERING
Reorganization Management Operation Construction
43 Cedar Street, New York City

**DAY & ZIMMERMANN, INC.**
ENGINEERS
DESIGN - CONSTRUCTION - REPORTS
VALUATIONS - MANAGEMENT
NEW YORK PHILADELPHIA CHICAGO

**WALTER JACKSON**
*Consultant on* Fares and Motor Buses
The Weekly Pass—Differential Fares
Ride Selling
143 Crary Ave., Mt. Vernon, N. Y.

The Most Successful Men in the Electric Railway Industry read the
**ELECTRIC RAILWAY JOURNAL**
Every Week

**Byllesby Engineering & Management Corporation**
208 S. La Salle Street, Chicago
New York Tacoma

# Car Roofs of HASKELITE are 30% lighter

Chicago Surface Lines' last 100 cars, soon to go into service, have Haskelite roofs, truss planking and bulkheads. In every location it saves weight, increases strength and improves appearance. Reduced weight lowers the center of gravity, improves riding qualities and lessens operating costs as much as $50 per year.

**PLYMETL**

Is Haskelite with steel faces, making superior side panels, vestibule linings and letter boards. Besides being very durable, it posesses great heat insulating value and deadens sound. Resisting indentation, it is easier to keep in good condition than steel.

Chicago Surface Lines use Haskelite for roofs, head linings and interior trim.



*Send for Blue Print Booklet*

HASKELITE MANUFACTURING CORPORATION
133 W. WASHINGTON ST., CHICAGO, ILL.

---

The Most Successful Men in the Electric Railway Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

---

C. B. BUCHANAN, President — W. H. PRICE, JR., Sec'y-Treas. — JOHN F. LAYNG, Vice-President

BUCHANAN & LAYNG CORPORATION

*Engineering and Management, Construction, Financial Reports, Traffic Surveys and Equipment Maintenance*

BALTIMORE, 825 Equitable Bldg. — Phone: Hanover 2142 — NEW YORK, 49 Wall Street

---

JAMES E. ALLISON & CO.
Consulting Engineers
Specializing in Utility Rate Cases and Reports to Bankers and Investors
1017 Olive St., St. Louis, Mo.

---

Transmission Line and Special Crossing Structures, Catenary Bridges
WRITE FOR OUR NEW DESCRIPTIVE CATALOG
ARCHBOLD-BRADY CO.
Engineers and Contractors — SYRACUSE, N. Y.

---

Bureau *of* Commercial Economics, *Inc.*
*Industrial Engineers*
Organization · Methods · Layout and Facilities
Public and Industrial Relations
72 West Adams Street · CHICAGO

---

THE P. EDWARD WISH SERVICE
50 Church St. — *Street Railway Inspection* DETECTIVES — 131 State St.
NEW YORK — BOSTON

---

HUMAN ENGINEERING
*Railway Audit and Inspection Company, Inc.*
*Fourth and Chestnut Sts., Philadelphia*
Boston, New Orleans, New York, Pittsburgh } BRANCHES { Baltimore, Chicago, Atlanta, St. Louis

---

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.



*The Spirit of Christmas*

THE true Christmas sprit is indicated by the wise selection of gifts. Captains of industry are recognizing Group Life Insurance as distinctly valuable to employees and their families.

Christmas is an ideal season for its adoption, for it is a gift with the cooperative spirit of good will.

The Prudential has insured many groups where life insurance has been used as an appropriate gift at Christmas.

We are prepared to lay a most interesting Christmas plan on the desk of any executive. Phone or write the local agency of the Company or communicate with the Home Office.

**The Prudential**

INSURANCE COMPANY OF AMERICA

EDWARD D. DUFFIELD, *President* HOME OFFICE, NEWARK, N. J.



GROUP LIFE INSURANCE requires no medical examination, there is no age limit and the cost is low. Employers and employees, under the Cooperative Plan, share the premium payments.

*Send for this Booklet*






## Facts on Electric Car Heaters broadcast from Station CCH

This is station CCH, the Consolidated Car Heating Company, broadcasting its weekly program to the electric railway industry, direct from its factory at Albany.

# Low Wire Temperature *means long life—*

By the use of the *open* coil principle in the electric heating unit, the resistance wire itself operates at a low temperature. In Consolidated Electric Car Heaters there are no red-hot wires. Ample air circulation around the *open coil* keeps the wire cool, and promptly puts the heat in circulation throughout the car. Wrapped snugly around the porcelain insulating tube, the resistance element is proof against vibration damage. As an additional factor of safety, a strong asbestos cord binds the coil securely to the porcelain insulator. Under no circumstances can the coil come in contact with the metal case, and "ground." **26 different types of Consolidated Electric Car Heaters have been inspected and approved by the Underwriters Laboratories maintained by the National Board of Fire Underwriters.**

These points indicate the secret of Consolidated success in the car-heater field. Because of their long life, and freedom from excessive maintenance requirements, Consolidated Electric Car Heaters are most widely known throughout the industry.

*Station C C H now signing off until next week when it will broadcast another message.*

**CONSOLIDATED**
# HEATERS




## CONSOLIDATED CAR-HEATING COMPANY

New York ALBANY, N. Y. Chicago



# Collier Service

A nation-wide organization building and sustaining car cardadvertising space values



**Barron G. Collier, Inc.**

Candler Bldg.

**New York**

# LUMNITE CEMENT

## *Gets ahead of Cold Weather with* SAFETY AND ECONOMY

THE quick work possible with Atlas Lumnite Cement solves the old problem of forestalling winter during concrete construction. When you are in a hustle to clean up the big job before cold weather sets in, Lumnite is the only material to use, because with it you can obtain twenty-eight-day concrete in twenty-four hours without using artificial accelerators.

Atlas Lumnite Cement is a hydraulic cement which develops greater strength at twenty-four hours than that developed by other building cements at twenty-eight days. This high early strength of Lumnite is made possible through its principal ingredient, bauxite, obtained from high-grade aluminum ore.

Lumnite has the particular advantage, in that it can be used in much colder weather than can other cements. It is less subject to frost for two reasons:

First, the rapid hydration or early hardening of Lumnite Cement brings the concrete, in a few hours, to a point in its curing beyond the danger of frost attack.

Second, this rapid hardening, a chemical action, produces very considerable heat in Lumnite Cement concrete. This forms an additional safeguard against the attack of frost.

Lumnite Cement is adapted to the various uses of concrete, and is not "quick-setting." It can be mixed and manipulated in the same manner as Portland Cement and allows the normal time required for mixing and placing in forms.

Lumnite, through its quick hardening, eliminates waste of both material and time. It is the most effective and economical material where cold weather or other emergencies make quick action necessary.

## THE ATLAS LUMNITE CEMENT CO.

25 *Broadway*, NEW YORK CITY

2000 First Avenue, Birmingham, Ala. 134 South LaSalle Street, Chicago




LUMNITE was used for this trolley roadbed in Hudson, N. Y. Concrete was placed on the morning of October 25, 1924, and 32-ton trolley cars were put in operation on the new road the morning of October 26th—only 26 hours after completion with LUMNITE.

D.E.R.R.J.

SEND THIS COUPON TODAY

Please send your booklet on Lumnite, also detailed information on Lumnite's use for_____

*Name*_____

*Address*_____

# Ten Years of Service has proved

# Rex METAL Sash

## and Weatherstrip

## to be practical, rugged, modern and economical

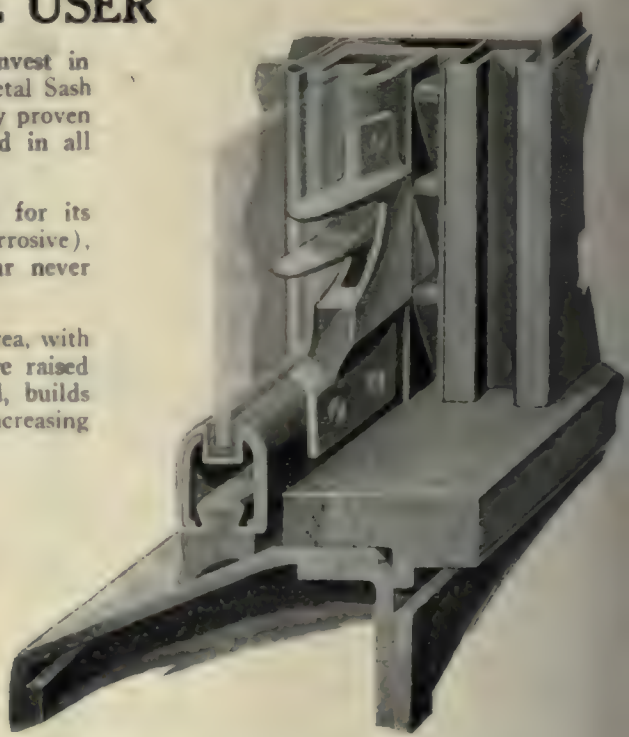
## ASK THE USER

Today's service requirements demand that every cent you invest in equipment should be wisely spent. The superiority of Rex Metal Sash and Weatherstrip, over ordinary wood sash, has been undeniably proven for electric traction service under all conditions of traffic and in all climates. ASK THE USER.

Strict modern specifications should include Rex Metal Sash for its great saving in maintenance. Rex Sash, being all metal (non-corrosive), does not swell, warp or crack—needs no re-painting. A car never goes to the shop for Sash repairs when Rex equipped.

There is the fireproof feature to consider and the greater light area, with Rex. Passengers appreciate the ease with which windows are raised and lowered. It is well known that the car, better equipped, builds revenue—Rex Sash does its share, to a profitable degree, in increasing revenue. ASK THE USER.

**Electric traction companies and Car Builders appreciate Rex economy and service value. Why not get details?**







### Some prominent users of Rex equipment

Baltimore & Ohio R. R. Co.
Boston Elevated
Chicago, Burlington & Quincy R. R.
Chicago, North Shore & Milwaukee R. R.
Chicago Rapid Transit Co.
Cleveland Railway
Indiana Service Corp.
Metropolitan Street Ry. Co.
New Orleans Public Service
New York Municipal Railway
Northern Ohio Traction Lines
Pacific Electric Co.

**The Curtain Supply Company**
**Factory, Elkhart, Ind.**

CHICAGO
355 W. Ontario St.

NEW YORK
80 Church St.

# Ebony Asbestos Wood



*Installation by the Bureau of Power and Light, Los Angeles, Calif.*

THE greatest possible electrical and mechanical safety goes with the attractive appearance of this Ebony Asbestos Wood combined Switch and Bench board, of the Bureau of Power and Light, Los Angeles, California. Ebony Asbestos Wood surpasses all other switchboard materials in dielectric strength and resistance to shock. It is easy to cut and drill.

JOHNS-MANVILLE, Inc., 292 Madison Ave., N.Y.C
Branches in 62 Large Cities
For Canada: Canadian Johns-Manville Co., Ltd., Toronto

Through Electrical Jobber Contractor and Dealer — Electrical Materials for Utilities

# JOHNS-MANVILLE



# *Amafuta*

The duty of the Kaffir valet is to make his master shine in society.

—so he covers the boss all over with amafuta (fat).

—which gives the old boy one of those rich mahogany glosses that only those who use Morganite brushes know.

—that gloss you see on the commutator once you get rid of misapplied brushes.

# Morganite Brush Co., Inc.

***Main Office and Factory:***
***519 West 38th St., New York***

DISTRICT ENGINEERS AND AGENTS

***Pittsburgh,*** Electrical Engineering & Mfg. Co., 909 Penn Ave.
***Cincinnati,*** Electrical Engineering & Mfg. Co., 607 Mercantile Library Building.
***Cleveland,*** Electrical Engineering & Mfg Co., 422 Union Building
***Philadelphia,*** Electric Power Equipment Corp., 412 North 18th St.
***Baltimore,*** O. T. Hall, Sales Engineer, 1926 Edmondson Ave.
***Revere, Mass.,*** J. F. Drummey, 75 Pleasant Street.
***Los Angeles,*** Special Service Sales Co., 502 Delta Building
***San Francisco,*** Special Service Sales Co., 202 Russ Building.
***Toronto, Can.,*** Railway & Power Engineering Corp., Ltd., 101 Eastern Ave.
***Montreal, Can.,*** Railway & Power Engineering Corp., Ltd., 326 Craig St., West.
***Winnipeg, Can.,*** Railway & Power Engineering Corp., Ltd., P. O. Box 35.




# 7 reasons why you should examine these great books on electrical maintenance and repair

1. The five books in this library discuss actual repair jobs and show you step by step what to do when anything goes wrong.
2. They show you how to locate and remedy motor and generator troubles.
3. They show you how to reconnect motors to meet any condition of voltage, phase, frequency and speed.
4. They give you suggestions for preventing electrical machinery troubles.
5. They cover fully the rewinding of motors.
6. They present information that will help you get better service out of your electrical equipment.
7. They give you tables, data, kinks and diagrams that you will find of priceless value every day on every job.

**Free examination—no money down—and a great armature winding book free if you order now!**

Fill in and mail the coupon attached and we will send you the entire set of five volumes for ten days' Free Examination. We take all the risk—pay all charges. You assume no obligation—you pay nothing unless you decide to keep the books. Then $2.00 in ten days and the balance at the rate of $2.00 a month. Send the coupon NOW and see the books for yourself. When your first payment of $2.00 is received we will send you a free copy of Croft's Alternating-Current Armature Winding.

## McGRAW-HILL FREE EXAMINATION COUPON

**McGraw-Hill Book Co., Inc., 370 Seventh Ave., New York**

Gentlemen:—Send me the LIBRARY OF ELECTRICAL MAINTENANCE AND REPAIR, all charges prepaid, for 10 days' Free Examination. If satisfactory I will send $2.00 in ten days and $2.00 a month until $14.00 has been paid. If not wanted I will write for shipping instructions.

Upon receipt of my first payment of $2.00 I am to receive a free copy of Croft's Alternating-Current Armature Winding.

Name .....

Home Address .....

City and State .....

Firm or Employer .....

Occupation ..... E. 12-13-24

IRVING SUBWAY



# IRVING SAFKAR STEP

TRADE MARK

ALL-STEEL AND PERMANENTLY NON-SLIPPING

One feels safe, comfortable, confident, secure—the moment one's foot rests upon this all-steel safety car step. Which means that it tends to minimize accidents and delays, and to speed up traffic. And it's more than a safe step—it is a clean, light, strong, durable step, with nothing about it to wear out or work loose. Its price is moderate—and there's no maintenance cost. There's just the size you need. See Catalog 4A-28.

## IRVING IRON WORKS CO.

LONG ISLAND CITY, N.Y., U.S.A.

MANUFACTURERS OF

# IRVING SUBWAY

TRADE MARK

(PATENTED) REG U S PAT OFF

THE FIREPROOF VENTILATING FLOORING

# DAYTON



Resilient TIE

## The Tie that Binds Lower Track Maintenance to Lower Rolling Stock Upkeep

Dayton Resilient Ties protect the concrete from breaking by cushioning the shock. That's lower track maintenance.

Dayton Resilient Ties prolong the life of rolling stock by absorbing the shocks that rack it to pieces. That's lower upkeep for rolling stock.

*Let us furnish detailed facts to prove these general statements.*

THE DAYTON MECHANICAL TIE CO.
707 Commercial Building, Dayton, Ohio

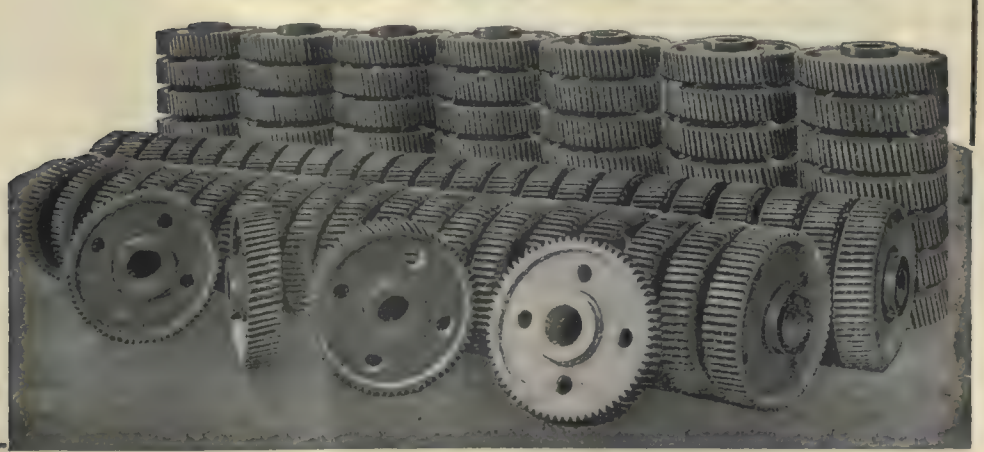
# Nothing but NUTTALL GEARS

## to meet current gear renewals

It is neither difficult nor expensive to standardize on Nuttall Helical Gears. As fast as those old spur gears wear out, replace them with sets of Helicals. Thereafter replacements will be few and far between for BP Helicals are guaranteed to last at least four times as long. Experience has proved it.

Order Helicals R.D.NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

*All Westinghouse Electric and Mfg. Co. District Offices are Sales Representatives in the United States for Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.*





# Quality + Safety = Satisfaction

In developing the safety car the St. Louis Car Co.'s standard of quality has been maintained from the smallest to the largest part going into the car. The results have brought satisfaction to all concerned—the users, the public and ourselves.

The St. Louis Car Company in the future as in the past will look to this three-cornered result—

***We make all types—what are your needs?***

## St. Louis Car Company

St. Louis, Mo.

*"The Birthplace of the Safety Car"*

---

# Your Passengers Will Enjoy Their Ride On

# Hale-Kilburn Seats

Especially Designed for
One Man Safety Cars



*Lightest Weight Stationary Steel Seat*

**Lightest**
**Strongest**
**Simplest**
**Neatest**



*Lightest Weight Walkover Steel Seat*

*No higher in price than others*
*Write for particulars*

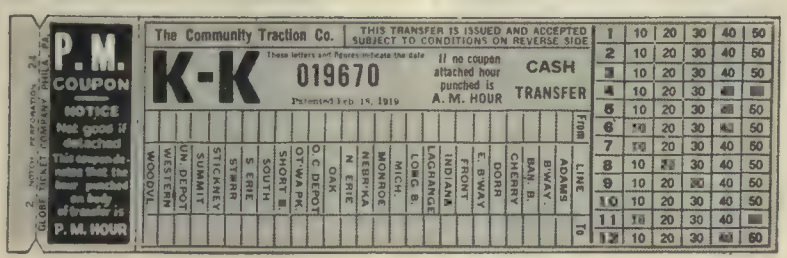
## Hale-Kilburn Company
**PHILADELPHIA**

| New York | Chicago | Richmond | Atlanta | San Francisco | Los Angeles |
|---|---|---|---|---|---|
| 30 Church St. | McCormick Bldg. | Mutual Bldg. | Candler Bldg. | 903 Monadnock Bldg. | 320 S. Pedro St. |

Safety cars
make
safer dividends
when equipped with
"Tool Steel" gears & pinions

Tool Steel Quality

**The Tool Steel**
**Gear and Pinion Co.**
CINCINNATI, O.




The symbol dated transfer is the safest and most economical.

Unused transfers can be turned back into stock at the end of the day, and used again.

With arbitrary symbols to represent the date, fraudulent use is almost impossible. The date symbols can be varied at will.

*If it's a ticket or check—we make it.*

**Globe Ticket Company** 116 N. 12th St. Philadelphia, Pa.
*Specialists in Tickets and Checks Since 1873* Los Angeles New York San Francisco

## AMELECTRIC PRODUCTS

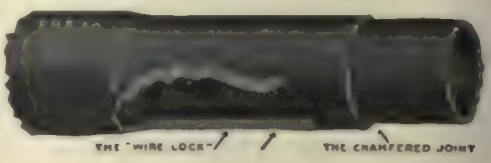
BARE COPPER WIRE AND CABLE
TROLLEY WIRE
WEATHERPROOF WIRE AND CABLE
PAPER INSULATED UNDERGROUND CABLE
MAGNET WIRE

Reg. U. S. Pat. Office
Incandescent Lamp Cord

**AMERICAN ELECTRICAL WORKS**
PHILLIPSDALE, R. I.

Boston, 176 Federal; Chicago, 113 W. Adams; Cincinnati, Traction Bldg.; New York, 100 E. 42nd St.

## ELRECO TUBULAR POLES




COMBINE
Lowest Cost
Least Maintenance
Lightest Weight
Greatest Adaptability

Catalog complete with engineering data sent on request.
ELECTRIC RAILWAY EQUIPMENT CO.
CINCINNATI, OHIO
New York City, 30 Church Street

## J-P Products of interest to Electric Railways


NOARK Fuses


NOARK Fuse Clips CUTOUT BASES


NOARK Service and Underground Boxes


Railway and Mine hangers and insulators


J-P Molding Service (Contract Basis)


VULCABESTON Sheet and Rope Packing

JOHNS-PRATT CO. HARTFORD, CONN.

## ANACONDA TROLLEY WIRE



ANACONDA COPPER MINING COMPANY
Conway Building, Chicago, Ill.
THE AMERICAN BRASS COMPANY
General Offices: Waterbury, Conn.

## PEIRCE
### Railway Feeder Pins



A strong Forged Steel Pin designed for heavy duty. Their low cost permits their use over the entire system.



HUBBARD & COMPANY
PITTSBURGH CHICAGO

TRADE
For dependable Line Material that will give you maximum service use
ANDERSON
MARK
Send for Latest Quotations
Main Office and Factory, Boston, Mass.




WELDING CABLE
ELECTRICAL WIRES and CABLES
John A. Roebling's Sons Company, Trenton, N. J.

## Chapman
## Automatic Signals
Charles N. Wood Co., Boston



## Shaw Lightning Arresters
*Standard in the Electric Industries for 35 years*
**Henry M. Shaw**
*150 Coit St., Irvington, Newark, N. J.*

## STANDARD

wires and cables are guaranteed by 43 years of successful service. They are standard in quality as in name. Made by the Standard Underground Cable Co. Pittsburgh, Pa. Branches in all principal cities.

## AUTOMATIC SIGNALS
Highway Crossing Bells
Headway Recorders
Flasher Relays
NACHOD SIGNAL COMPANY, INC.
LOUISVILLE, KENTUCKY.





Trade Mark

***Only reliable products can be continuously advertised***

## We are prepared

to handle any high grade proposition where

VARNISHED CAMBRIC

Wires and Cables

are required.

When using *quality* Wires and Cables use *quality* Tapes.

"MANSON" Tape, "OKONITE" Tape, "DUNDEE" Tapes.

THE OKONITE CO., Passaic, N. J.

Incorporated 1884

OKONITE

TRADE MARK.

*Sales Offices: New York—Atlanta—Pittsburgh—San Francisco.*
*Agents:* Central Electric Co., Chicago, Ill. Pettingell-Andrews Co., Boston, Mass.; The F. D. Lawrence Electric Co., Cincinnati, Ohio; Novelty Electric Co., Philadelphia, Pa.
*Canadian Representatives:* Engineering Materials Limited, Montreal.

B. A. HEGEMAN, Jr., President — C. C. CASTLE, First Vice-President
H. A. HEGEMAN, Vice-Pres. and Treas. — F. T. SARGENT, Secretary
W. C. PETERS, Manager Sales and Engineering

## National Railway Appliance Co.

Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., New York
Munsey Bldg., Washington, D. C. — 100 Boylston St., Boston, Mass.
Hegeman-Castle Corporation, Railway Exchange Building, Chicago.

RAILWAY SUPPLIES

Tool Steel Gears and Pinions
Bell Locked Fare Box and Change Maker
The Aluminum Field Coils
Walter Tractor Snow Plows
Cutler-Hammer Electric Heaters
Pittsburgh Forge & Iron Co.'s Products
Genesco Paint Oils
B. Z. Car Control Corporation's Safety Devices
Garland Ventilators
Flaxlinum Insulation
Yellow Coach Mfg. Co.'s Single and Double Deck Buses
Economy Electric Devices Co.'s Power Saving and Inspection Meters
Anglo-American Varnish Co., Varnishes, Enamels, etc.
Gilmer Multiple Safety Step Treads
National Hand Holds
Ft. Pitt Spring & Mfg. Co., Springs
Turnstile Car Corporation's Turnstiles
Anderson Slack Adjusters
Feasible Drop Brake Staffs
Dunham Hopper Door Device

# Arc Weld Rail Bonds

AND ALL OTHER TYPES

*Descriptive Catalogue Furnished*

## American Steel & Wire Company

Chicago
New York
Boston
Cleveland
Pittsburgh
Denver
U. S. Steel Products Co.
San Francisco — Los Angeles — Portland — Seattle

"CARNEGIE"

*for*

WHEELS
AXLES
RAILS
CROSS TIES



Carnegie Steel Company
PITTSBURGH, PENNA.

## BARBOUR-STOCKWELL CO.

205 Broadway, Cambridgeport, Mass.
Established 1858

Manufacturers of

Special Work for Street Railways

Frogs, Crossings, Switches and Mates
Turnouts and Cross Connections
Kerwin Portable Crossovers
Balkwill Articulated Cast Manganese Crossings

ESTIMATES PROMPTLY FURNISHED

## Lorain Special Trackwork Girder Rails

*Electrically Welded Joints*

THE LORAIN STEEL COMPANY

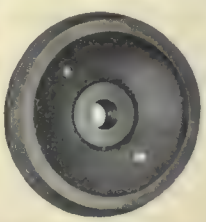
Johnstown, Pa.

*Sales Offices:*

Atlanta — Chicago — Cleveland — New York — Philadelphia — Pittsburgh

*Pacific Coast Representative:*
United States Steel Products Company
Los Angeles — Portland — San Francisco — Seattle

*Export Representative:*
United States Steel Products Company, New York, N. Y.



*Cambria Rolled Steel Electric Car Wheels*

*Best for Longer Service*

Other products for the electrical field includes axles, armature shafts, rails, spikes, track work, splice bars, bolts, tie plates, tie rods, pole line material, sheets, magnet steel and gear blanks.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

# BETHLEHEM

# THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

**Builders since 1868 of Water Tube Boilers of continuing reliability**

BRANCH OFFICES

BOSTON, 49 Federal Street
PHILADELPHIA, Packard Building
PITTSBURGH, Farmers Deposit Bank Building
CLEVELAND, Guardian Building
CHICAGO, Marquette Building
CINCINNATI, Traction Building
ATLANTA, Candler Building
PHOENIX, ARIZ., Heard Building
DALLAS, TEX., 2001 Magnolia Building
HONOLULU, H. T., Castle & Cooke Building
PORTLAND, ORE., 805 Gasco Building




WORKS

Bayonne, N. J.
Barberton, Ohio

**Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893**

BRANCH OFFICES

DETROIT, Ford Building
NEW ORLEANS, 521-5 Baronne Street
HOUSTON, TEXAS, Southern Pacific Building
DENVER, 435 Seventeenth Street
SALT LAKE CITY, 405-6 Kearns Building
SAN FRANCISCO, Sheldon Building
LOS ANGELES, 404-6 Central Building
SEATTLE, L. C. Smith Building
HAVANA, CUBA, Calle de Aguiar 104
SAN JUAN, PORTO RICO, Royal Bank Building

THE WORLD'S STANDARD

# "IRVINGTON"

Black and Yellow
Varnished Silk, Varnished Cambric, Varnished Paper

Irr-O-Slot Insulation Flexible Varnished Tubing
Insulating Varnishes and Compounds

**Irvington Varnish & Insulator Co.**
Irvington, N. J.

*Sales Representatives in the Principal Cities*

## OXYGEN, ACETYLENE, HYDROGEN

*for cutting, welding, etc.*

Quick shipment and low prices also on cylinders, valves, torches, regulators and supplies.

**INTERNATIONAL OXYGEN COMPANY**
Main Offices: Newark, N. J.
Branch Offices: New York Pittsburgh Toledo

## RAMAPO AJAX CORPORATION

Ramapo Automatic Return Switch Stands for Passing Sidings

RACOR

RACOR Tee Rail Special Work

Manganese Construction

GENERAL OFFICES: HILBURN, NEW YORK
Chicago New York Superior, Wis. Niagara Falls, N. Y.
Canadian Ramapo Iron Works, Ltd., Niagara Falls, Ont.

# ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.

Electrical Machinery, Steam Turbines, Steam Engines, Condensers, Gas and Oil Engines, Air Compressors, Air Brakes

## RAILWAY UTILITY COMPANY

CAR COMFORT WITH
**UTILITY**
HEATERS
REGULATORS
VENTILATORS

141-151 West 22d St. Chicago, Ill.
*Write for Catalogue*
1328 Broadway New York, N. Y.

FERALITE

## ALUMINO-THERMIC JOINTS

New and independent process. No inserts needed. Up-to-date and economical.

**Alumino-Thermic Corp., Roselle Park, N. J.**

## "Boyerized" Products Reduce Maintenance

Bemis Trucks
Case Hardened Brake Pins
Case Hardened Bushings
Case Hardened Nuts and Bolts
Manganese Brake Heads
Manganese Transom Plates
Manganese Body Bushings
Bronze Axle Bearings

Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.

**Bemis Car Truck Co., Springfield, Mass.**

## A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

**Cameron Electrical Mfg. Co., Ansonia, Connecticut**

## HORNE & EBLING CORPORATION

50 CHURCH ST., NEW YORK, N. Y.

Brass Hardware For Cars and Buses

Motor and Controller Parts

HORNE

Sterling Trolley Bases and Brakes

Mall. Iron and Brass Castings

# GALVANIZING

HOT DIP

We have the largest jobbing galvanizing plant and kettles in the United States. We guarantee our galvanizing to stand eight one minute dips in the Standard Copper Sulphate Solution Test. *Galvanized Products furnished.*

**JOSEPH P. CATTIE & BROTHERS**
Gaul and Letterly Sts., Philadelphia, Penna.

## NEW and RELAYING RAILS

1 TON OR 1000

TRACK EQUIPMENT

L·B·FOSTER CO.

RAIL ACCESSORIES

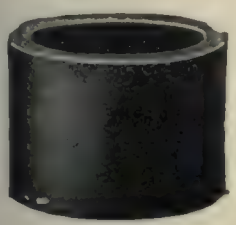
PITTSBURGH - PENNSYLVANIA

NEW YORK · JERSEY CITY · PHILADELPHIA · HAMILTON, O.

TULC
A LUBRICANT

We make a specialty of
ELECTRIC RAILWAY LUBRICATION
We solicit a test of TULC on your equipment
The Universal Lubricating Co.
Cleveland, Ohio
Tulc, Inc., Eastern Representative,
1617 Gotham National Bank Bldg., New York City

"Longwear" Pins and Bushings
*Hard—Accurate—Uniform*



Renewal Materials for Peckham and other Trucks

E.G. Long Company
50 Church Street, New York, N. Y.



N-L Type "AA"
Bus Ventilator

45 Out of 54!

On 45 of the 54 buses exhibited at the Atlantic City Convention N-L Ventilators were used. This shows what the foremost bus body builders think of N-L Ventilators.

Many leading street railways have standardized on them also.

It is no longer necessary to argue for the advantages of good ventilation. It is now universally recognized as a necessity for profitable car and bus service.

Write for a copy of *"Superior Ventilation."*

The Nichols-Lintern Company
7960 Lorain Ave. Cleveland, Ohio
Canadian Rep.: Railway & Power Eng. Corp., Ltd.,
133 Eastern Ave., Toronto, Ont.

N-L

PANELYTE
HEADLININGS
THE PANELYTE COMPANY, Trenton, N. J.

SAMSON SPOT WATERPROOFED TROLLEY CORD

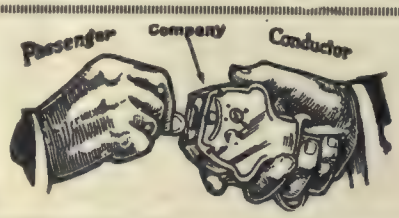


Trade Mark Reg. U. S. Pat. Off.
Made of extra quality stock firmly braided and smoothly finished.
Carefully inspected and guaranteed free from flaws.
Samples and information gladly sent.
SAMSON CORDAGE WORKS, BOSTON, MASS.

PS HEATERS
Car Heating and Ventilation
are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.
The Peter Smith Heater Company
6209 Hamilton Ave., Detroit, Mich.

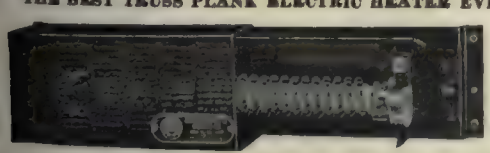
PROVIDENCE FENDERS
H-B LIFE GUARDS
The Consolidated Car Fender Co., Providence, R. I.
Wendell & MacDuffie Co., 110 E. 42nd St., New York
General Sales Agents

Heywood-Wakefield
CAR SEATS
of pressed Steel for all Classes of Passenger Service. Rattan for covering seats and for snow sweepers.
HEYWOOD-WAKEFIELD CO.
Factory at Wakefield, Mass.
Offices at New York, Chicago, San Francisco
For detailed description see — CAR BUILDERS CYCLOPEDIA 1922 Edition




Direct Automatic Registration By the Passengers
Rooke Automatic Register Co.
Providence, R. I.

THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



No. 478E
GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.



*Gets Every Fare*
PEREY TURNSTILES or PASSIMETERS
Use them in your Prepayment Areas and Street Cars
Perey Manufacturing Co., Inc.
101 Park Avenue, New York City




Type R-11
Double Register

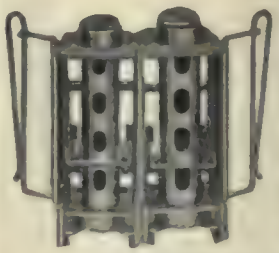
## International Registers

Made in single and double types to meet requirements of service. For hand or foot, mechanical or electric operation. Counters, car fittings, conductors' punches.

Exclusive selling agents for HEEREN ENAMEL BADGES.

**The International Register Co.**
15 South Throop Street, Chicago, Illinois

## JOHNSON Universal Changer



### Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

### Flexible.

Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

**JOHNSON FARE BOX COMPANY**
Ravenswood, Chicago, Ill.

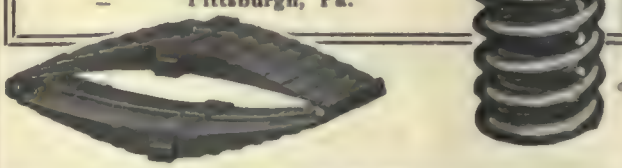
## Play for safety—

*plus resiliency—*
*plus long life*

*By specifying*

**FORT PITT SPRINGS**

FORT PITT SPRING & MFG. CO.
Pittsburgh, Pa.



## The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



**THE STAR BRASS WORKS**
KALAMAZOO, MICH., U. S. A.

# If there is anything you want—

or something you don't want that *other* readers of this paper can supply—or use—advertise in the

## Searchlight Section

***NOW***— is the time to offer good second-hand equipment or machinery for sale. The demand is great for good plant for immediate delivery. That's why you should advertise NOW.

***NOW***— or any other time, use the Searchlight Section for advertising

| | | | |
|---|---|---|---|
| Agencies Wanted | Contracts Wanted | Miscellaneous Wants | Positions Wanted |
| Agents Wanted | Educational Courses | New Industries Wanted | Property For Sale |
| Auction Notices | Employment Agencies | Partners Wanted | Receivers' Sales |
| Buildings For Sale | Exchanges | Patents For Sale | Representatives Wanted |
| Business Opportunities | For Rent Items | Patent Attorneys | Salesmen Wanted |
| Civil Service Opportunities | Franchises | Plants For Sale | Work Wanted |
| Contracts To Be Let | Industrial Sites | Positions Vacant | Etc., Etc., Etc. |

35

Let Us Tell You of Our Especially Designed Fare Box for the

**ONE MAN CAR**

**THE CLEVELAND FARE BOX COMPANY**
Cleveland, Ohio
Canadian Cleveland Fare Box Co., Ltd., Preston, Ontario

For better Axles Specify
**"VALSCO"**
**HEAT TREATED CAR AXLES**
**LACLEDE STEEL CO.**
Arcade Bldg. St. Louis, Mo.

100 New Users in the Last Nine Months
**KASS SAFETY TREADS**
HIGH
in efficiency and lasting qualities
LOW
in weight, initial and upkeep costs
Morton Manufacturing Co., Chicago



**STUCKI SIDE BEARINGS**
A. STUCKI CO.
Oliver Bldg.
Pittsburgh, Pa.

You're having brush trouble

CORRECT IT

USE LE CARBONE CARBON BRUSHES

They talk for themselves

COST MORE PER BRUSH
COST LESS PER CAR MILE

W. J. Jeandron
345 Madison Avenue, New York
Pittsburgh Office: 634 Wabash Bldg.
Chicago Office: 1657 Monadnock Block
San Francisco Office: 525 Market Street
Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal and Toronto

BRAKE SHOES
AERA Standards
Brake Heads



Diamond "S" Steel Back and Lug Shoes best for all equipment.

Manufactured and sold under U. S. Patent and Registered Trade Mark.

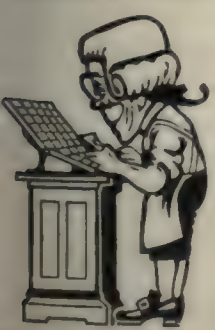
American Brake Shoe and Foundry Co.
30 Church Street, New York
332 So. Michigan Ave., Chicago



Multiple Unit Control, double truck car for two-man operation.

McGUIRE-CUMMINGS
*Manufacturing Company*
General Offices
111 W. Monroe St., Chicago, Ill.
Street Cars, Trucks
Snow Sweepers

Advertisements for the
Searchlight Section



Can be received at the New York Office of Electric Railway Journal until 10 a. m.

Wednesday

For issue out Saturday

0220



MORE-JONES "TIGER-BRONZE" AXLE AND ARMATURE BEARINGS

*Not always the cheapest, but ever lowest in ultimate cost*

MORE-JONES BRASS & METAL CO.
St. Louis, Missouri.

## Griffin Wheel Company

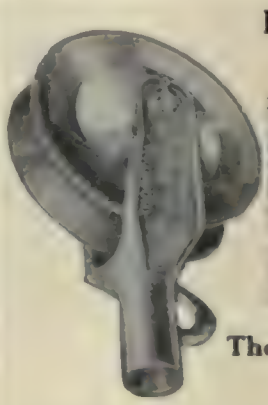
410 North Michigan Ave.
Chicago, Ill.

# GRIFFIN
# F. C. S.
# WHEELS

## For Street and Interurban Railways

FOUNDRIES:

| | | |
|---|---|---|
| Chicago | Boston | St. Paul |
| Detroit | Kansas City | Los Angeles |
| Denver | Council Bluffs | Tacoma |



## He expects more than 100,000 miles

Mr Bickle, Chief Motor Inspector of the Louisville Railway Company, says: "All of the Thornton Side Bearings we have tried out are still in use and in fine condition. Some of them have made close to 50,000 miles and it looks like they might make more than double that mileage before we have finished the test."

Did you ever hear of such service? Get the facts about this noiseless, vibrationless, perfectly balanced and longer lasting trolley device.

**Thornton Trolley Wheel Co.**
Incorporated
Ashland, Kentucky

"Axle Specialists Since 1866"
Address all Mail to Post Office Box 515, Richmond, Va.

## CAR AXLES
## J. R. JOHNSON AND CO., INC.

FORGED STEEL AXLES

For Locomotives, Passenger, Freight and Electric Cars
Smooth Forged or Rough Turned—Carbon or Alloy Steel—Plain or Heat Treated, Forged and Turned Piston Rods, Crank Pins, Large Shafts, Round Bars, etc.



## CHILLINGWORTH

One-Piece Gear Cases
Seamless—Rivetless—Light Weight
Best for Service—Durability and Economy. *Write Us.*

**Chillingworth Mfg. Co.**
Jersey City, N. J.

# BUY BRUSHES
## MADE IN THE U. S. A.

USG

CARBON—GRAPHITE—METAL
MOTOR AND GENERATOR BRUSHES

**Meet every requirement**

Grade recommendations, based upon your individual requirements and operating conditions, made by experienced Brush Engineers, guarantee long life and perfect service.

*Write for Catalog B-3.*

THE UNITED STATES GRAPHITE COMPANY
SAGINAW, MICHIGAN, U. S. A.




## Don't Overlook Opportunities

Men who regularly keep in touch with the market through other channels often overlook the many opportunities that are to be found in the

## SEARCHLIGHT SECTION

For Every Business Want
*"Think* SEARCHLIGHT *First"*

# SEARCHLIGHT SECTION

## USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD:

*Positions Wanted*, 4 cents a word, minimum 75 cents an insertion, payable in advance.

*Positions Vacant* and all other classifications, 8 cents a word, minimum charge $2.00.

*Proposals*, 40 cents a line an insertion.

INFORMATION:

*Box Numbers* in care of any of our offices count 10 words additional in undisplayed ads.

*Discount* of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 to 3 inches.....$4.50 an inch
4 to 7 inches..... 4.30 an inch
8 to 14 inches..... 4.10 an inch

Rates for larger spaces, or yearly rates, on request.

*An advertising inch* is measured vertically on one column, 3 columns—30 inches—to a page.

E.F.J.

### POSITION VACANT

HOP foreman wanted for electric railway in New England. Give experience, reference, age and salary expected in first letter. P-752, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

### POSITIONS WANTED

UDITOR, broad and thorough experience in financing and accounting; all branches railway, electric and gas utilities, open for engagement. Possess initiative and capable of assuming full control of all accounting matters. PW-758, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

XECUTIVE, nine years manager of local street railway system in industrial town seeks larger opportunity. Thirteen years' prior experience in engineering, transportation and executive departments of large trunk line railroad. Has given special study to analyzing transportation problems and operating costs. PW-761, Electric Railway Journal, Real Estate Trust Bldg., Philadelphia, Pa.

UPERINTENDENT—City or interurban; twelve years' successful experience in maintenance, operation and public relations. PW-757, Electric Railway Journal, 10th Ave. at 36th St., New York.

RAFFIC and transportation superintendent—Experienced interurban and city railway and bus operation, desire to connect with organization inaugurating bus service. PW-759, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.


WANTED

Order for Oak, Car Stock, Cross Ties, Switch Ties, Timber. Have four mills in operation. A good stand of timber, grades guaranteed. Prices right. Let's get acquainted.

ENARC LUMBER MFG. CO.
411 Aouw Bldg., Little Rock, Ark.

WE WANT TO BUY
30—West. 306-C.V.-4
MOTORS
Have you any to offer?
ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

"Searchlight"
is
Quick Action
Advertising
0233




In Small Lots
As Well As Large

THERE is a class of rail buyers, occasionally in need of only small tonnages, who are paying a premium on their purchases elsewhere because they believe that we do not seek their patronage.

We maintain a large organization to give efficient service on small orders. Our tremendous volume gives us unequaled buying power and saves our clients money regardless of the tonnage required.

Immense stocks at strategic distributing points provide complete assortments near you. This adds a saving in freight to our already unbeatable prices.

Next time you need rails, let us know your requirements.

*We guarantee the same prompt, efficient service to all.*

HYMAN-MICHAELS COMPANY
*"The House of Dependable Service"*
122 South Michigan Avenue, Chicago

Dealers in New and Relaying Rails,
Locomotives and Railway Equipment

*District Offices:* New York, Woolworth Bldg.;
St. Louis, Railway Exchange Bldg.; Pittsburgh, First Nat'l Bank Bldg.;
San Francisco, 234 Steuart St.
*Yards:* St. Louis, East Chicago, Ind., McKee's Rocks, Pa., San Francisco.
*Cable Address:* "Hymanmikel"
*World's Largest Distributors of Rails*

FOR SALE
Two Single Truck
Snow Sweepers
Complete
Ready for operation
Splendid condition
Transit Equipment Co.
Cars — Motors
501 Fifth Avenue, New York

RAILS
New Relaying
1 TON = 1000
FROGS
SWITCHES
SPLICE BARS
BOLTS
NUTS
TIE PLATES
RAIL
ETC.
All Rails and Track Materials shipped subject to inspection and approval at destination.
L.B. Foster Co.
PITTSBURGH PA
O.L.B.F.C. NEW YORK

FOR SALE
Taylor Trucks
4—Complete, 34-in. steel wheels with 8-G.E. 200-C motors, all in first class condition.
Receivers, Morris County Traction Company
Morristown, N. J.

425 TONS—No. 1
80 LB. RELAYING RAILS
EXCEPTIONALLY FINE SHAPE
*Immediate Shipment—Low Price*
ZELNICKER IN ST. LOUIS

# WHAT AND WHERE TO BUY

**Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue**

**Advertising, Street Car**
Collier, Inc., Barron G.

**Air Receivers & Aftercoolers**
Ingersoll Rand Co.

**Anchors, Guy**
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

**Armature Shop Tools**
Elec. Service Supplies Co.

**Automatic Return Switch Stands**
Ramapo Ajax Corp.

**Automatic Safety Switch Stands**
Ramapo Ajax Corp.

**Axles**
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Johnson & Co., J. R.
Laclede Steel Co.
St. Louis Car Co.
Standard Steel Wks.
Westinghouse E. & M. Co.

**Badges and Buttons**
Elec. Service Supplies Co.
International Register Co., The

**Batteries, Dry**
National Carbon Co.

**Bearings and Bearing Metals**
Bemis Car Truck Co.
Brill Co., J. G., The
General Electric Co.
More-Jones Brass & Metal Co.
St. Louis Car Co.
Westinghouse E. & M. Co.

**Bearings, Center and Roller Side**
Stucki Co., A.

**Bells and Gongs**
Brill Co., The J. G.
Consolidated Car Heat. Co.
Elec. Service Supplies Co.
St. Louis Car Co.

**Bearings, Roller**
Norma-Hoffman Bearings Corp.

**Bollers**
Babcock & Wilcox Co.

**Bonding Apparatus**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Track-work Co.

**Bonds, Rail**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse E. & M. Co.

**Book Publishers**
McGraw-Hill Book Co.

**Boxes, Switch**
Johns-Pratt Co.

**Brackets and Cross Arms**
(See also Poles, Ties, Posts, Etc.)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

**Brake Adjusters**
Brill Co., The J. G.
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.

**Brake Shoes**
Amer. Br. Shoe & Fdy. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.

**Brakes, Brake Systems and Brake Parts**
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
General Electric Co.
Horne & Ebling Corp.
Johns Manville, Inc.
National Brake Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.

**Brushes, Carbon**
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Morganite Brush Co.
National Carbon Co.
U. S. Graphite Co.
Westinghouse E. & M. Co.

**Brushes Graphite**
Morganite Brush Co.
National Carbon Co.
U. S. Graphite Co.

**Brushes Wire Pneumatic**
Ingersoll-Rand Co.

**Buses, Motor**
Brill Co., The J. G.
International Motor Co.
Pierce Arrow Motor Car Co.
St. Louis Car Co.

**Bushings, Case Hardened and Manganese**
Bemis Car Truck Co.
Brill Co., The J. G.
Long Co., E. G.
St. Louis Car Co.

**Cables. (See Wires and Cables)**

**Cambric Tapes, Yellow and Black Varnish**
Irvington Varnish & Ins. Co.

**Carbon Brushes (See Brushes, Carbon)**

**Cars, Dump**
Brill Co., J. G., The
Differential Steel Car Co.
St. Louis Car Co.

**Car Lighting Fixtures**
Elec. Service Supplies Co.

**Car Panel Safety Switches**
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.

**Cars, Passenger, Freight, Express, etc.**
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

**Cars, Gas, Rail**
Brill Co., J. G., The
St. Louis Car Co.

**Cars, Second Hand**
Electric Equipment Co.
Transit Equipment Co.

**Cars, Self-Propelled**
Brill Co., J. G., The
General Electric Co.

**Car Steps Safety**
Irving Iron Wks.

**Car Wheels, Rolled Steel**
Bethlehem Steel Co.

**Castings, Brass, Composition or Copper**
Anderson Mfg. Co., A. & J. M.
More-Jones Brass & Metal Co.

**Castings, Gray Iron and Steel**
Bemis Car Truck Co.
Fort Pitt Steel Castings Co.
St. Louis Car Co.
Standard Steel Wks.

**Castings, Malleable and Brass**
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Fort Pitt Steel Castings Co.
Horne & Ebling Corp.
St. Louis Car Co.

**Catchers and Retrievers, Trolley**
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

**Catenary Construction**
Archbold-Brady Co.

**Ceilings, Plywood, Panels**
Haskelite Mfg. Co.

**Cement Products**
Atlas Lumnite Co.

**Chains, Parlor Car**
Heywood-Wakefield Co.

**Change Carriers**
Cleveland Fare Box Co.

**Circuit-Breakers**
Anderson, A. & J. M. Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Clamps and Connectors for Wires and Cables**
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

**Cleaners and Scrapers Track**
(See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
St. Louis Car Co.

**Clusters and Sockets**
General Electric Co.

**Coal and Ash Handling (See Conveying and Hoisting Machinery)**

**Coil Banding and Winding Machines**
Elec. Service Supplies Co

**Coils Armature and Field**
General Electric Co.
Westinghouse E. & M. Co.

**Coils, Choke and Kicking**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

**Coin Counting Machines**
Cleveland Fare Box Co.
Internat'l Register Co.
Johnson Fare Box Co.

**Coin Sorting Machines**
Cleveland Fare Box Co.

**Coin Wrappers**
Cleveland Fare Box Co.

**Commutator Slotters**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co

**Commutator Truing Devices**
General Electric Co.

**Commutators or Parts**
Cameron Elec'l Mfg. Co.
General Electric Co
Westinghouse E. & M. Co.

**Compounds (Insulating & Splicing)**
Johns-Manville, Inc.

**Compressors, Air**
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll Rand Co.
Westinghouse Tr. Br. Co.

**Concrete Flooring Surface**
Irving Iron Wks.

**Concrete Reinforcing Bars**
Laclede Steel Co.

**Condenser Papers**
Irvington Varnish & Ins. Co

**Condensers**
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll Rand Co.
Westinghouse E. & M. Co.

**Connectors, Solderless**
Frankel Connector Co.
Westinghouse E. & M. Co.

**Connectors, Trailer Car**
Consolidated Car Heat. Co.
Elec. Service Supplies Co.
Ohio Brass Co.

**Controllers or Parts**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Controller Regulators**
Elec. Service Supplies Co.

**Controlling Systems**
General Electric Co.
Westinghouse E. & M. Co.

**Converters, Rotary**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Copper Wire**
Anaconda Copper Mining Co.

**Cord, Bell, Trolley, Register**
Brill Co., The J. G.
Elec. Service Supplies Co.
Internat'l Register Co., The
Roebling's Sons Co., John A.
St. Louis Car Co.
Samson Cordage Works

**Cord Connectors and Couplers**
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

**Couplers Car**
Brill Co., The J. G.
Ohio Brass Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.

**Cross Arms (See Brackets)**

**Crossing Foundations**
International Steel Tie Co.

**Crossing, Frog & Switch**
Ramapo Ajax Corp.

**Crossing, Manganese**
Bethlehem Steel Co.
Ramapo Ajax Corp.

**Crossings**
Ramapo Ajax Corp.

**Crossings, Track (See Track, Special Work)**

**Crossings, Trolley**
Ohio Brass Co.

**Curtains & Curtain Fixtures**
Brill Co., The J. G.
Curtain Supply Co.
Elec. Service Supplies Co.
Morton Mfg. Co.
St. Louis Car Co.

**Dealer's Machinery**
Elec. Equipment Co.
Hyman-Michaels Co.
Transit Equipment Co.

**Derailing Devices (See also Track Work)**

**Derailing Switches**
Ramapo Ajax Corp.

**Destination Signs**
Elec. Service Supplies Co.

**Detective Service**
Wish-Service, P. Edward

**Door Operating Devices**
Brill Co., The J. G.
Consolidated Car Heat. Co.
General Electric Co.
Nat'l Pneumatic Co., Inc.
St. Louis Car Co.

**Doors & Door Fixtures**
Brill Co., The J. G.
Consolidated Car Heat. Co.
General Electric Co.
Morton Mfg. Co.

**Doors, Folding Vestibule**
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.

**Drills, Track**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ingersoll Rand Co.
Ohio Brass Co.

**Dryers, Sand**
Elec. Service Supplies Co

**Ears**
Ohio Brass Co.

**Ebony Asbestos Wood**
Johns-Manville, Inc.

**Electrical Wires and Cables**
Amer. Electrical Works
Amer. Steel & Wire Co.
Roebling's Sons & Co., J. A.

**Electric Grinders**
Railway Track-work Co.
Western Electric Co.

**Electrodes, Carbon**
Railway Track-work Co.

**Electrodes, Steel**
Railway Track-work Co.

**Engines Gas, Oil or Steam**
Ingersoll Rand Co.

**Engineers, Consulting, Contracting and Operating**
Allison & Co., J. S.
Archbold-Brady Co.
Beeler, John A.
Buchanan & Layng Corp.
Bureau of Commercial Economics, Inc.
Byllesby & Co., H. M.
Day & Zimmerman, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Ong, Joe B.
Railway Audit & Inspection Co.
Richey, Albert S.
Robinson & Co., Dwight P.
Sanderson & Porter
Stevens & Wood
Stone & Webster
White Eng. Corp., The J. G.

**Engineering Equipment Engineering Co.**

**Engines, Gas, Oil or Steam**
Allis-Chalmers Mfg. Co.
Westinghouse E. & M. Co.

**Fare Boxes**
Cleveland Fare Box Co.
Johnson Fare Box Co.
Nat'l Ry Appliance Co.

**Fare Registers**
Ohmer Fare Register Co.

**Fences, Woven Wire and Fence Posts**
Amer. Steel & Wire Co.
Cyclone Fence Co

**Fenders and Wheel Guards**
Brill Co., The J. G
Consolidated Car Fender Co
Elec. Service Supplies Co.
St. Louis Car Co.

**Fibre and Fibre Tubing**
Johns-Manville, Inc.
Westinghouse E. & M. Co

**Field Coils (See Coils)**

**Fire Extinguishers**
Johns-Manville, Inc.

**Floodlights**
Elec. Service Supplies Co.

**Flooring Composition**
Johns-Manville, Inc.

**Flooring, Fireproof**
Irving Iron Wks.

**Flooring, Non-Slipping**
Irving Iron Wks.

**Flooring, Open Steel**
Irving Iron Wks.

**Flooring, Steel Subway**
Irving Iron Wks.

**Flooring Ventilating**
Irving Iron Wks.

**Forgings**
Brill Co., J. G., The
Standard Steel Wks.

**Frogs & Crossings, Tee Rail**
Bethlehem Steel Co.
Ramapo Ajax Corp.

**Frogs, Track (See Track Work)**

**Frogs, Trolley**
Ohio Brass Co.

**Fuses and Fuse Boxes**
Consolidated Car Heat.
General Electric Co.
Westinghouse E. & M.

**Fuses, Cartridge, Non-Refillable & High Volta**
Johns-Pratt Co.

**Fuses, Refillable**
General Electric Co.
Johns-Manville, Inc.
Johns-Pratt Co.

**Galvanizers, Hot Dip**
Jos. P. Cattie & Bros

**Gaskets**
Johns-Manville, Inc
Westinghouse Tr. Br. C

**Gas Producers**
Westinghouse E. & M.

**Gas-Electric Cars**
General Elec. Co.
Westinghouse E. & M.

**Gates, Car**
Brill Co., The J. G
St. Louis Car Co.

**Gear Blanks**
Bethlehem Steel Co
Brill Co., J. G., The
Standard Steel Wks.

**Gear Cases**
Chillingworth Mfg. Co.
Elec. Service Supplies Co
Westinghouse E. & M.

**Gears and Pinions**
Bemis Car Truck Co.
Bethlehem Steel Co.
Elec. Service Supplies C
General Electric Co.
Nat'l Ry Appliance Co
Nuttall Co., R. D.
Tool Steel Gear & Pinio Co.

**Generating Sets, Gas-Electr**
General Electric Co

**Generators**
Allis-Chalmers Mfg. Co
General Electric Co.
Westinghouse E. & M.

**Girder Rails**
Bethlehem Steel Co.
Lorain Steel Co.

**Gong (See Bells and Gongs**

**Grating Steel Subway**
Irving Iron Wks

**Greases (See Lubricants)**

**Grinders and Grind Supplie**
Indianapolis Switch & Fro Co
Railway Track-work Co.

**Grinders, Portable**
Railway Track-work Co.

**Grinders, Portable Electr**
Railway Track-work Co

**Grinding Bricks and Whee**
Railway Track-work Co

**Guard Rail Clamps**
Ramapo Ajax Corp.

**Guard Rails, Tee Rail & Manganese**
Ramapo Ajax Corp.

**Guards, Trolley**
Elec. Service Supplies Co
Ohio Brass Co.

**Hammers, Pneumatic**
Ingersoll Rand Co.

**Harps, Trolley**
Elec. Service Supplies Co
More-Jones Brass Metal Co
Nuttall Co., R. D.
Star Brass Works
Thornton Trolley Wheel Co

**Headlights**
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.

**Headlining**
Haskelite Mfg. Co.
Panelyte Co.

**Heaters, Car (Electric)**
Consolidated Car Heat Co
Gold Car Heat. & Ltg Co
Nat'l Ry. Appliance Co.
Smith Heater Co., Peter

**Heaters, Car, Hot Air and Water**
Elec. Service Supplies Co.
Smith Heater Co., Peter

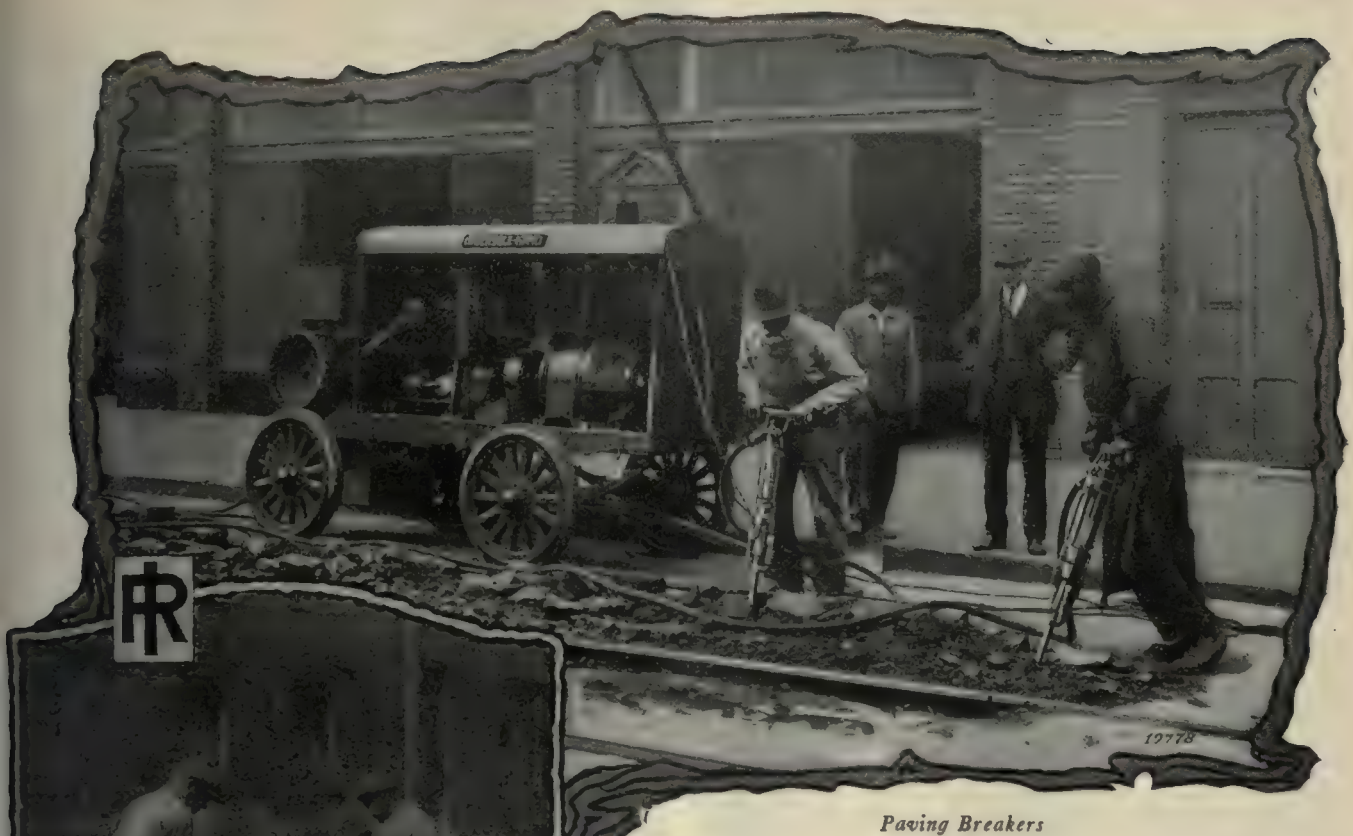
**Helmets—Welding**
Railway Track-work Co.

**Hoists, Portable**
Ingersoll Rand Co.

**Hydraulic Machinery**
Allis-Chalmers Mfg. Co

**Industrial Flooring**
Johns-Manville, Inc

**Instruments Measuring, Testing and Recording**
Elec. Service Supplies Co
General Electric Co.
Johns-Pratt Co.
Westinghouse E. & M. Co



*Paving Breakers*



*Tie Tampers*

## The Compressed Air Way Saves Time and Money

Ingersoll - Rand Portable Air Compressors and Tools finish up many jobs in a fraction of the time required by hand methods.

Pneumatic "Paving Breakers" save more than 50% in time and labor over hand methods, when breaking out pavement shoulders, heavy foundations, etc.

Pneumatic Tie Tampers enable four men to tamp more track and do it better than twelve to sixteen men using hand methods.

Other air tools are also used to save money on various jobs, making the portable compressor outfit a most important factor in reducing track costs. Ask for complete information on the savings made with portable air-power units.

***Ingersoll-Rand Track Tools include—***

**Paving Breakers,**
**Tie Tampers,**
**Grinders,**
**Riveters,**
**Chippers,**
**Spike Drivers**

**INGERSOLL-RAND COMPANY, 11 Broadway, New York**

*Offices in Principal Cities the World Over*

**For Canada refer Canadian Ingersoll-Rand Co., Limited, 260 St. James Street, Montreal, Quebec**

# Ingersoll-Rand

**Insulating Cloth, Paper and Tape**
General Electric Co.
Irvington Varnish & Ins. Co.
Johns-Manville, Inc.
Mitchell-Rand Mfg. Co.
Okonite Co.
Stand. Underground Cable Co.
Westinghouse E. & M. Co.

**Insulating, Silk & Varnish**
Irvington Varnish & Ins. Co.

**Insulation (See also Paints)**
Electric Ry. Equipment Co.
Elec. Service Suplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Johns-Manville, Inc.
Mitchell-Rand Mfg. Co.
Okonite Co.
Westinghouse E. & M. Co.

**Insulation Slots**
Irvington Varnish & Ins. Co.

**Insulators (See also Line Materials)**
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse E. & M. Co.

**Insulator Pins**
Elec. Service Supplies Co.
Hubbard & Co.

**Insulators, High Voltage**
Lapp Insulator Co., Inc.

**Insurance, Life**
Prudential Insurance Co.

**Jacks (See also Cranes, Hoists and Lifts)**
Elec. Service Supplies Co.

**Joints, Rail**
(See Rail Joints)

**Journal Boxes**
Bemis Car Truck Co.
Brill Co., J. G.
Fort Pitt Steel Castings Co.
St. Louis Car Co.

**Junction Boxes**
Std. Underground Cable Co.

**Lamps, Guards and Fixtures**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

**Lamps, Arc & Incandescent**
(See also Headlights)
General Electric Co.
Westinghouse E. & M. Co.

**Lamps, Signal and Marker**
Nichols-Lintern Co.
Ohio Brass Co.

**Lanterns, Classification**
Nichols-Lintern Co.

**Lightning Protection**
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Shaw, Henry M.
Westinghouse E. & M. Co.

**Line Material (See also Brackets, Insulators, Wires, etc.)**
Archbold-Brady Co.
Electric Ry. Equipment Co.
Elec. Service Sup. Co.
General Electric Co.
Hubbard & Co.
Johns-Manville, Inc.
More-Jones Brass & Metal Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

**Locomotives, Electric**
General Electric Co.
McGuire-Cummings Mfg. Co
St. Louis Car Co.
Westinghouse E. & M. Co.

**Locomotive Oil Engine, Electric Driver**
Ingersoll Rand Co

**Lubricating Engineers**
Galena Signal Oil Co.
Universal Lubricating Co.

**Lubricants, Oil and Grease**
Galena Signal Co
Universal Lubricating Co.

**Manganese Parts**
Bemis Car Truck Co.

**Manganese Steel Castings**
Wm. Wharton, Jr. & Co

**Manganese Steel Guards Rails**
Ramapo Ajax Corp.

**Manganese Steel, Special Track Work**
Bethlehem Steel Co.

**Manganese Steel Switches Frogs & Crossings**
Bethlehem Steel Co.
Ramapo Ajax Corp.

**Meters (See Instruments)**

**Molding, Metal**
Allis-Chalmers Mfg. Co.

**Motor Buses (See Buses, Motor)**

**Motors, Electric**
Allis-Chalmers Mfg. Co.
Westinghouse E. & M. Co.

**Motors and Generators, Sets**
Allis-Chalmers Mfg. Co.
General Electric Co.

**Motormen's Seats**
Brill Co., J. G.
Elec. Service Sup. Co.
Heywood-Wakefield Co.
St. Louis Car Co.
Wood Co., Chas. N.

**Nuts and Bolts**
Barbour-Stockwell Co.
Bemis Car Truck Co.
Bethlehem Steel Co.
Hubbard & Co.

**Oils (See Lubricants).**

**Omnibuses (See Buses, Motor)**

**Oxygen**
International Oxygen Co.

**Oxy-Acetylene (See Cutting Apparatus, Oxy-Acetylene)**

**Packing**
Elec. Service Suplies Co.
Johns-Manville, Inc.
Westinghouse E. & M. Co.

**Paints and Varnishes (Insulating)**
Irvington Varnish & Ins. Co.
Mitchell-Rand Mfg. Co.

**Paints and Varnishes for Woodwork**
National Ry. Appliance Co

**Pavement Breakers**
Ingersoll Rand Co.

**Paving Material**
Amer. Br. Shoe & Fdy. Co.

**Pickup, Trolley Wire**
Elec. Service Supplies Co.
Ohio Brass Co.

**Pinion Pullers**
Elec. Service Supplies Co
General Electric Co.
Wood Co., Chas. N.

**Pinions (See Gears)**

**Pins, Case Hardened, Wood and Iron**
Bemis Car Truck Co.
Elec. Service Sup. Co.
Ohio Brass Co.
Westinghouse Tr. Brake Co.

**Pipe Fittings**
Standard Steel Wks.
Westinghouse Tr Brake Co.

**Planers (See Machine Tools)**

**Plates for Tee Rail Switches**
Ramapo Ajax Corp

**Pliers, Rubber Insulated**
Elec. Service Sup. Co.

**Pneumatic Tools**
Ingersoll Rand Co.

**Pole Line Hardware**
Bethlehem Steel Co.
Ohio Brass Co.

**Poles, Metal Street**
Elec. Ry. Equipment Co.
Hubbard & Co.

**Pole Reinforcing**
Hubbard & Co.

**Poles & Ties Treated**
Bell Lumber Co.

**Poles, Ties, Posts, Piling & Lumber**
Bell Lumber Co.

**Poles, Trolley**
Bell Lumber Co.
Elec. Service Supplies Co.
Nuttall Co., R. D.

**Poles, Tubular Steel**
Elec. Ry. Equipment Co.
Elec. Service Sup. Co.

**Porcelain Special High Voltage**
Lapp Insulator Co., Inc.

**Potheads**
Okonite Co.

**Power Saving Devices**
National Ry. Appliance Co
Railway Improvement Co.

**Pressure Regulators**
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

**Pumps**
Allis-Chalmers Mfg. Co.
Ingersoll Rand Co.

**Pumps Vacuum**
Ingersoll Rand Co.

**Punches, Ticket**
Intern'l Register Co., The
Wood Co., Chas. N.

**Rail Braces & Fastenings**
Ramapo Ajax Corp

**Rail Grinders (See Grinders)**

**Rail Joints**
Carnegie Steel Co.

**Rail Joints—Welded**
Lorain Steel Co.

**Rails, Relaying**
Foster Co., L. B.
Hyman-Michaels Co.

**Rails, Steel**
Bethlehem Steel Co.
Carnegie Steel Co.
Foster Co., L. B.

**Railway Paving Guards, Steel**
Godwin Co., Inc., W. S.

**Railway Safety Switches**
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.

**Rail Welding**
Railway Track-work Co.

**Rattan**
Brill Co., The J. G.
Elec. Service Supplies Co.
Heywood-Wakefield Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

**Registers and Fittings**
Brill Co., The J. G.
Elec. Service Supplies Co.
Intern'l Register Co., The
Rooke Automatic Register Co.
St. Louis Car Co.

**Reinforcement, Concrete**
Amer. Steel & Wire Co.

**Repair Shop Appliances (See also Coil Banding and Winding Machines)**
Elec. Service Supplies Co.

**Repair Work (See also Coils)**
General Electric Co.
Westinghouse E. & M. Co.

**Replacers, Car**
Elec. Service Sup. Co.

**Resistances**
Consolidated Car Heat. Co.

**Resistance, Wire and Tube**
General Electric Co.
Westinghouse E. & M. Co.

**Retrievers, Trolley (See Catchers and Retrievers, Trolley)**

**Rheostats**
General Electric Co.
Westinghouse E. & M. Co.

**Roofing Asbestos**
Johns-Manville, Inc.

**Roofing Car**
Pantasote Co., Inc.

**Roofs**
Haskelite Mfg. Co.

**Sanders, Track**
Brill Co., The J. G.
Elec. Service Sup. Co.
Horne & Elding Corp.
Nichols-Lintern Co.
Ohio Brass Co.
St. Louis Car Co.

**Sash Fixtures, Car**
Brill Co., The J. G.
St. Louis Car Co.

**Scrapers, Track (See Cleaners and Scrapers, Track)**

**Screw Drivers, Rubber Insulated**
Elec. Service Sup. Co.

**Seats, Bus**
Brill Co., J. G., The
Heywood-Wakefield Co.
St. Louis Car Co.

**Seats, Car (See also Rattan)**
Brill Co. The J. G.
Heywood-Wakefield Co.
St. Louis Car Co.

**Seating Materials**
Brill Co., J. G.
Heywood-Wakefield Co.
Pantasote Co., Inc.
St. Louis Car Co.

**Second Hand Equipment**
Electric Equipment Co.
Hyman-Michaels Co.
Transit Equipment Co.

**Shades, Vestibule**
Brill Co., The J. G.

**Shovels**
Brill Co., The J. G.
Hubbard & Co.

**Side Bearings (See Bearings, Center and Side)**

**Signals, Car Starting**
Consolidated Car Heat Co
Elec. Service Sup. Co.
Nat'l Pneumatic Co., Inc.

**Signals, Indicating**
Nichols-Lintern Co.

**Signal Systems, Highway Crossing**
Nachod Signal Co., Inc.
Wood Co., Chas. N.

**Signal Systems, Block**
Elec. Service Sup. Co.
Nachod Signal Co., Inc.

**Slack Adjusters (See Brake Adjusters)**

**Steel Wheels and Cutters**
Anderson Mfg. Co., A. & J. M.
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.

**Smokestacks, Car**
Nichols-Lintern Co.

**Sockets & Receptacles**
National Metal Molding Co

**Snow Sweepers, Rattan**
Heywood-Wakefield Co

**Snow-Plows, Sweepers and Brooms**
Brill Co., The J. G.
Consolidated Car Fender Co
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

**Sockets and Receptacles**
Johns-Manville, Inc.

**Soldering and Brazing Apparatus (See Welding Processes and Apparatus)**
Irvington Varnish & Ins. Co.

**Solderless, Connector**
Frankel Connector Co.

**Special Adhesive Papers**
Irvington Varnish & Ins. Co.

**Special Trackwork**
Bethlehem Steel Co.
Lorain Steel Co.

**Spikes**
Amer. Steel & Wire Co.

**Splicing Compounds**
Westinghouse E. & M. Co.

**Splicing Sleeves (See Clamps and Connectors)**

**Springs, Car and Truck**
Amer. Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Fort Pitt Spring & Mfg. Co.
St. Louis Car Co.
Standard Steel Wks.

**Sprinklers, Track and Road**
Brill Co., The J. G.
McGuire-Cummings Mfg. Co
St. Louis Car Co.

**Stair Steps, Safety**
Irving Iron Wks.

**Steel and Steel Products**
Carnegie Steel Co.

**Steps, Car**
Brill Co., J. G., The
Morton Mfg. Co.

**Stokers, Mechanical**
Babcock & Wilcox Co.
Westinghouse E. & M. Co.

**Stop Signals**
Nichols-Lintern Co.

**Storage Batteries (See Batteries, Storage)**

**Strain, Insulators**
Anderson, A. & J. M. Mfg. Co.
Ohio Brass Co.

**Strand**
Roebling's Sons Co., J. A.

**Straps, Car, Sanitary**
Railway Improvement Co.

**Subway Boxes**
Johns-Pratt Co.

**Superheaters**
Babcock & Wilcox Co.

**Sweepers, Snow (See Snow Plows, Sweepers and Brooms)**

**Switch Boxes**
Johns-Manville, Inc.

**Switches, Safety**
Johns-Pratt Co.

**Switches, Selector**
Nichols-Lintern Co.

**Switches, Tee Rail**
Ramapo Ajax Corp.

**Switches, Track (See Track Special Work)**

**Switches and Switchboards**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

**Tamper Tie**
Ingersoll-Rand Co.
Railway Track-work Co.

**Tapes and Cloths (See Insulating Cloth, Paper and Tape)**

**Tee Rail Special Track Work**
Bethlehem Steel Co.
Ramapo Ajax Corp.

**Telephones and Parts**
Elec. Service Supplies Co.

**Terminals, Cable**
Std. Underground Cable Co

**Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)**

**Thermostats**
Consolidated Car Heat. Co.
Gold Car Heat. & Ltg. Co.
Railway Utility Co.
Smith Heater Co., Peter

**Ticket Choppers & Destroyers.**
Elec. Service Supplies Co

**Tickets & Transfers**
Globe Ticket Co

**Ties, All-Metal**
Metal Safety R. R. Tie Co

**Ties, Mechanical**
Dayton Mechanical Tie Co.

**Ties and Tie Rods, Steel**
Barbour-Stockwell Co.
Carnegie Steel Co.
International Steel Tie Co

**Ties, Wood Cross (See Poles, Ties, Posts, etc.)**

**Tool Steel**
Bethlehem Steel Co.

**Tools, Track & Miscellaneous**
Amer. Steel & Wire Co.
Elec. Service Supplies Co
Hubbard & Co.
Railway Track-work Co.

**Torches, Acetylene (See Cutting Apparatus)**

**Towers and Transmission Structures**
Archbold-Brady Co.
Westinghouse E. & M. Co

**Track Grinders**
Railway Track-work Co

**Trackless Trolley Cars**
Brill Co., J. G., The
St. Louis Car Co.

**Track, Special Work**
Barbour-Stockwell Co.
Bethlehem Steel Co.
Ramapo Ajax Corp.

**Transfer (See Tickets)**

**Transfer Tables**
American Bridge Co.

**Transformers**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Treads, Safety, Stair, Car Step**
Morton Mfg. Co.

**Trolley Bases**
Elec. Service Supplies Co.
General Electric Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Ohio Brass Co.

**Trolley Bases, Retrieving**
Elec. Service Supplies Co.
Nuttall Co., R. D.
Ohio Brass Co.

**Trolley Buses**
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M Co.

**Trolley Material, Overhead**
Anderson, A. & J. M. Mfg. Co.
Elec. Service Supplies Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.

**Trolley Wheel Bushings**
More-Jones Brass & Metal Co.

**Trolley Wheels & Harps**
More-Jones Brass & Metal Co.
Thornton Trolley Wheel Co

**Trolley Wheels (See Wheels, Trolley)**

**Trolley Wire**
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Roebling's Sons Co., J. A.

**Trucks, Car**
Bemis Car Truck Co.
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
Taylor Elec. Truck Co.

**Tubing, Yellow & Black Flexible Varnish**
Irvington Varnish & Ins. Co.

**Turbines, Steam**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Turbines, Water**
Allis-Chalmers Mfg. Co.

**Turnstiles**
Elec. Service Supplies Co.
Perey Mfg. Co., Inc

**Valves**
Ohio Brass Co
Westinghouse Tr. Br. Co.

**Varnished Papers & Silks**
Acme Wire Co
Irvington Varnish & Ins. Co.

**Ventilators, Car**
Brill Co., The J. G
Nat'l Ry. Appliance Co.
Nichols-Lintern Co.
Railway Utility Co.
St. Louis Car Co.

**Welded Rail Joints**
Alumino Thermic Corp.
Ohio Brass Co.
Railway Track-work Co.

**Welders, Portable Electric**
Ohio Brass Co
Railway Track-work Co.

**Welding & Cutting Tools**
International Oxygen Co.

**Welding Processes and Apparatus**
Alumino-Thermic Corp.
General Electric Co
International Oxygen Co.
Ohio Brass Co
Railway Track-work Co
Westinghouse E & M Co.

**Welding Steel**
Railway Track-work Co

**Wheel Guards (See Fenders and Wheel Guards)**

**Wheel Presses (See Machine Tools)**

**Wheels, Car, Cast Iron**
Bemis Car Truck Co.
Carnegie Steel Co.
Griffin Wheel Co.

**Wheels Car Steel & Steel Tire**
Standard Steel Wks.

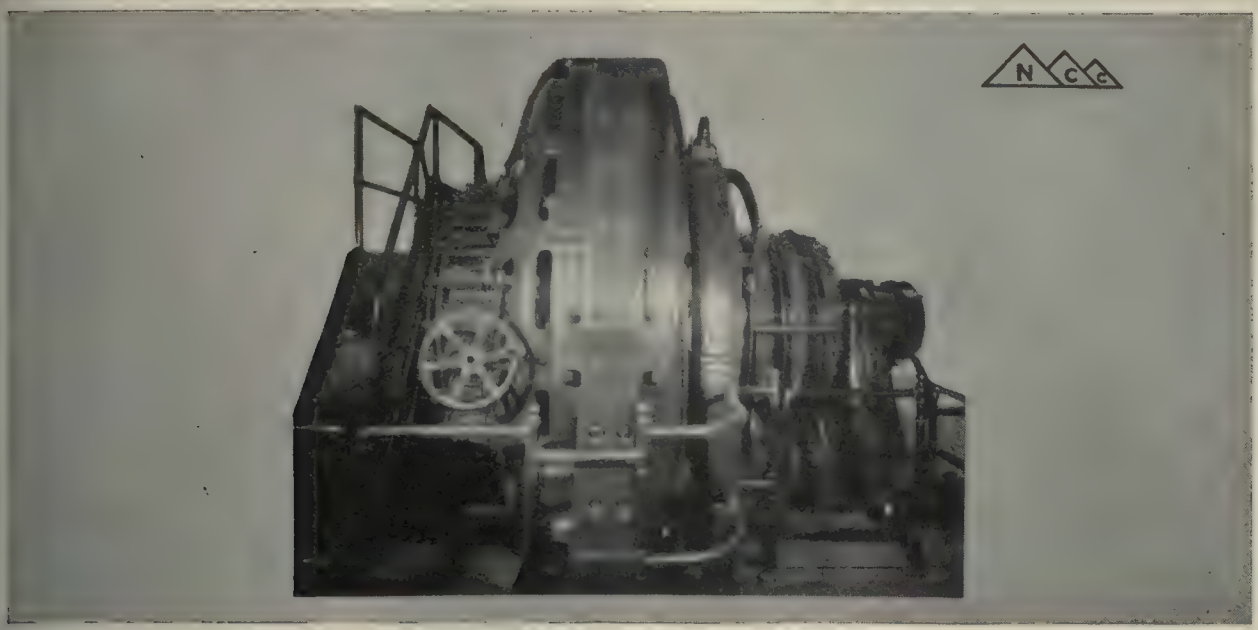
**Wheels, Wrought Steel**
Carnegie Steel Co.

**Wheels, Trolley**
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Star Brass Works.

**Whistles, Air**
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

**Wire Rope**
Roebling's Sons Co., J. A.

**Wires and Cables**
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
General Electric Co.
Okonite Co.
Roebling's Sons Co., J. A.
Std. Underground Cable Co.
Westinghouse E. & M. Co.



## 259

SUPREME on the DC side of rotary converters—NCC 259. This remarkable brush, developed by the Union Carbide & Carbon Research Laboratories, gives minimum commutator wear. It does not burn the commutator, and it minimizes the possibility of flashovers. It is quiet in operation even on large converters with high peripheral speeds, and its life is commensurate with the service.

In two years since its general introduction it has become the most successful and most talked-of brush for rotary converter service.

## Ringsdorff ET-10

COOLER ring temperatures and higher operating efficiency are secured by using the famous Ringsdorff ET-10 on the AC side of rotary converters. This brush has lower contact losses—that's why machines fitted with it run cooler and more efficiently. It is comparatively free from dusting. This is indicated by the lessened wear of both rings and brushes.

These marked advantages in operation and the longer life of Ringsdorff ET-10 make it an economical brush even at its somewhat higher price.

# National Pyramid Brushes

*Manufactured and guaranteed by*

NATIONAL CARBON CO., INC., Cleveland, Ohio—San Francisco, Cal.

Canadian National Carbon Co., Limited, Toronto, Ontario

*Emergency Service Plants*

CHICAGO, ILL.
551 West Monroe St.
*Phone*, STAte 6092

PITTSBURGH, PA.
7th Floor, Arrott Power Bldg. No. 3
Barker Place
*Phone*, SMIthfield 0740

NEW YORK, N. Y.
237 East 41st St.
*Phone*, VANderbilt 0425

# ALPHABETICAL INDEX TO ADVERTISEMENTS


Page

A

Allison Co., J. E. ..... 21
Allis-Chalmers Mfg. Co. ..... 34
Alumino-Thermic Corp. ..... 34
Amer. Brake Shoe & Fdy. Co. ... 37
American Car Co. ..... 45
American Electrical Works .... 32
American Steel Foundries ..... 16
American Steel & Wire Co. ..... 33
Anaconda Copper Milling Co. ... 32
Anderson Mfg. Co., A. & J. M. .. 32
Archbold-Brady Co. ..... 21
Atlas-Lumnite Cement Co. ..... 25

B

Babcock & Wilcox Co. ..... 34
Barbour-Stockwell Co. ..... 33
Beeler Organization ..... 20
Bell Lumber Co. ..... 44
Bemis Car Truck Co. ..... 34
Bethlehem Steel Co. ..... 33
Brill Co., The J. G. ..... 45
Buchanan & Layng Corp. ..... 21
Bureau of Comm. Economics, Inc. ..... 21
Byllesby & Co., H. M. ..... 20

C

Cameron Electrical Mfg. Co. ... 34
Carnegie Steel Co. ..... 33
Cattie & Bros., Jos. P ..... 34
Chillingworth Mfg. Co ..... 38
Cleveland Fare Box Co. ..... 36
Collier, Inc., Barron G. ..... 24
Consolidated Car Fender Co ... 35
Consolidated Car Heating Co. ... 23
Curtain Supply Co. ..... 26
Cyclone Fence Co. ..... 6

D

Day & Zimmermann, Inc. ..... 29
Dayton Mech. Tie Co. ..... 29
Differential Steel Car Co., The .. 15

E

Electric Equipment Co. ..... 39
Electric Ry. Equipment Co. .... 32
Electric Service Supplies Co. . 9

F

"For Sale" Ads ..... 39
Ford, Bacon & Davis ..... 20
Fort Pitt Spring & Mfg. Co. .... 36
Foster Co., Inc., L. B. ..... 34

G

Galena-Signal Oil Co. ..... 17
General Electric Co. . 18, Back Cover
Globe Ticket Co. ..... 31
Gold Car Heating & Ltg. Co . 35
Griffin Wheel Co. ..... 38

H

Hale-Kilburn Co ..... 30
Haskelite Mfg. Co ..... 21
"Help Wanted" Ads ..... 39
Hemphill & Wells ..... 20
Hexwood Wakefield Co ..... 35
Holst, Engelhard W ..... 20
Horne & Ehrlich ..... 34
Hubbard & Co. ..... 32
Hyman-Michaels Co ..... 39

I

Ingersoll-Rand Co. ..... 41
International Motor Co . 12-13
International Oxygen Co. ..... 34
International Register Co., The. 36
International Steel Tie Co., The 7
Irving Iron Works Co. ..... 28
Irvington Varnish & Insulator Co. 34

J

Jackson, Walter ..... 20
Jeandron, W. J. ..... 37
Johns-Manville Inc ..... 27
Johns-Pratt Co ..... 32

Page

Johnson & Co., Inc., J. R .... 38
Johnson Fare Box Co. ..... 36

K

Kuhlman Car Co. ..... 45

L

Laclede Steel Co. ..... 36
Lapp Insulator Co., Inc ..... 32
Le Carbone Co ..... 37
Long E J ..... 38
Lorain Steel Co. ..... 30

M

McGraw-Hill Book Co., Inc. .... 28
McGuire-Cummings Mfg. Co. ... 37
Mitchell-Rand Mfg Co. ..... 8
More-Jones Brass & Metal Co. . 37
Morganite Brush Co., Inc. .... 27
Morton Mfg. Co. ..... 36

N

Nachod Signal Co ..... 32
National Brake Co ..... 19
National Carbon Co. ..... 43
National Pneumatic Co., Inc. ... 11
National Ry. Appliance Co. .... 33
Nichols-Lintern Co ..... 35
Nuttall Co., R. D. ..... 29

O

Ohio Brass Co. ..... 5
Okonite Co., The ..... 33
Ong, Joe B. ..... 20

P

Panelyte Co. ..... 35
Percy Mfg Co., Inc ..... 35
Pierce-Arrow Motor Car Co. .... 14
Positions Wanted and Vacant .. 39

Pa

Prudential Insurance Co. of America .....

R

Railway Audit & Inspection Co.
Railway Track-work Co. ....
Railway Utility Co. .....
Ramapo Ajax Corp .....
Richey, Albert S .....
Robinson Co., Dwight P
Roebling's Sons Co., John A. ..
Rooke Automatic Register Co .

S

St. Louis Car Co. .....
Samson Cordage Works .....
Sanderson & Porter .....
Searchlight Section .....
Shaw, Henry M. .....
Smith Heater Co., Peter. .....
Standard Underground Cable Co.
Star Brass Works. .....
Stevens & Wood, Inc .....
Stone & Webster .....
Stucki Co., A

T

Thornton Trolley Wheel Co.
Tool Steel Gear & Pinion Co.
Transit Equipment Co. .

U

Universal Lubricating Co
U S Graphite Co .....

W

"Want" Ads .....
Wason Mfg Co. .....
Westinghouse Elec. & Mfg Co.
West'gh'se Traction Brake Co. .
White Eng Corp., The J G .
Wish Service, The P. Edw .
Wood Co., Chas. N. .....



Northern **CEDAR POLES** Western

We guarantee
all grades of poles; also any butt-treating specifications

**BELL LUMBER COMPANY**
Minneapolis, Minn.

THE SEARCHLIGHT SECTION
*will locate the* Man you want
Position you want
Equipment you want

*Are you using the Searchlight?*



# KUHLMAN STEEL BODIES

**After all, length of service, maintenance cost and passenger protection depend entirely upon materials and construction behind the paint.**

The type of bus body which will best withstand the severe treatment of public transportation service, and at the same time provide necessary protection to passengers, is the best investment. That's why Kuhlman Type "G" Bodies are built of steel and reflect our long experience in building vehicles for public transportation service.

***Write for your copy of Bulletin No. 283***

**THE J. G. BRILL COMPANY**
PHILADELPHIA, PA.

AMERICAN CAR CO. ST. LOUIS MO. — G.C. KUHLMAN CAR CO. CLEVELAND, OHIO. — WASON MANF'G CO. SPRINGFIELD, MASS.



AURORA, ELGIN AND FOX RIVER ELECTRIC COMPANY
AURORA, ILLINOIS

September 4, 1924.

MR. A.P. JENKS,
Railway Department,
General Electric Co.,
Illinois Merchants Bank Bldg.,
Chicago, Illinois.

Dear Mr. Jenks:-

Noticing your adv. on the back cover of the Electric Railway Journal, August 30th issue, where your company very graciously used photographs of our cars, I thought perhaps it would be interesting for you to know that we have now had our city cars, which are equipped with the GE-264 motors, in operation one year, each car averaging approximately 4200 miles per month. Our interurbans with the GE-265 motors have only been in operation approximately nine months, averaging 5000 miles per month. Now that our summer business is nearly over, we are taking down all motors, making a complete and thorough inspection, cleaning all parts. I am certain it will be interesting to your company to know that we have not as yet had one failure in any of the GE-264 motors and only one failure in the GE-265 motors, this being occasioned by the motorman's mis-use when stuck in a snow drift with one pair of trucks off track last February.

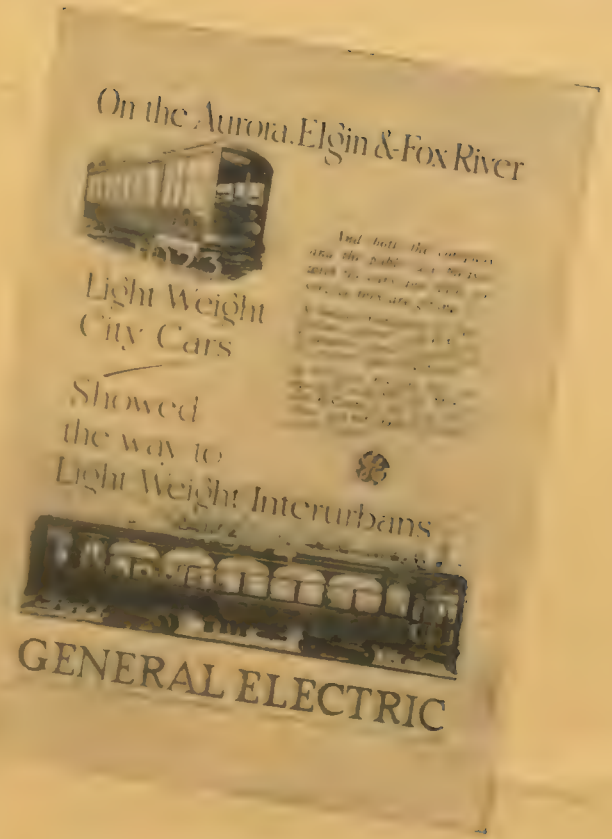
To me this is a wonderful record, where equipment on forty-seven cars has stood up as this equipment has and not suffered one failure of any description. If this information is of any value to you, you may use these figures to whatever extent you may desire.

With kindest personal regards,

I beg to remain,

Yours very truly,

GENERAL MANAGER.


## More Modernization Results

G-E modern equipment on this middle-west road is living up to the high standard it has set on many other progressive properties.

General Electric Company
Schenectady, N. Y.

MAINTENANCE ISSUE

-Hill Company, Inc. December 20, 1924 Twenty Cents Per Copy

ELECTRIC RAILWAY JOURNAL

*If your general manager says:*

*"What About Steel Ties"*

*The first cost is low* — Steel Twin Ties cost about One Dollar per track foot at Cleveland. Economy of concrete and grading make the complete track cost less than any other concrete design.

*The construction is renewable* — Steel Twin Tie Construction provides a permanent foundation on which a complete and approved method of rail renewal has been worked out on over five miles of track.

*The structure is uniform* — A combination of track foundation and paving, uniform in its action under both car and vehicle traffic. The coefficient of expansion of steel and concrete are nearly identical.

*New methods of installation* — New methods of initial installation, designed to insure complete bearing, eliminate shrinkage and make rail renewal easy.

*Experience of users can be obtained* — Fourteen years of experience as to service, together with initial and maintenance cost is now available.

*Your quotation, accompanying the complete folder on Steel Ties, is based on a stock of steel which guarantees you a firm price on Steel Ties for the first half of next year.*

THE INTERNATIONAL STEEL TIE COMPANY :: :: CLEVELAND

**Steel Twin Tie Track**

**Renewable Track · · Permanent Foundation**



# Christmas Time on the Road of Progress
## Westinghouse Program for Better Maintenance

"Come in, boys," said Joe, the General Manager. "I want to tell you how pleased our executives are with the splendid performance of our equipment. We have handled the Christmas rush traffic this year better than ever. Every car we have has been pressed into revenue service and the failures have been negligible."

Big Bill, the Master Mechanic, grinned broadly and stuck out his chest, saying, "Well, Boss, we're glad you're glad. The boys in the shop are all delighted with their accomplishment, too. Much of the credit for this fine showing belongs to Doughboy Dan, our Transportation Engineer. We've got our whole maintenance program worked down to a sensible, scientific basis. We're studying causes and effect, we are. Dan and I have worked out simple schemes and records that show what our detail costs are, as well as the basic causes for this and that failure and, believe me, we have found that a 'stitch in time saves nine.' That's why our equipment is making the good showing that it is. Isn't that right, Dan?"

Dan exclaims, "There's no question about it, and, Boss, we have really only made a good start. *Westinghouse Railway Operating Data* has been worth its weight in gold to us. One of the Westinghouse maintenance and renewal parts engineers was with us for a couple of weeks. His help was invaluable. We expect to double our motor-bearing life this coming year. Did you know, Boss, that Westinghouse has started a nation-wide program for better maintenance during 1925?"

"No, I did not," declared the General Manager. "That's a splendid, worth-while service to the Industry."

## Westinghouse 1925 Better Maintenance Program

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.
*Sales Offices in All Principal American Cities*

# Westinghouse

. 64, No. 25 New York, December 20, 1924 Pages 1021-1062

# ELECTRIC RAILWAY JOURNAL

RIS BUCK
iate Editor
. SQUIER
iate Editor
N A. MILLER, Jr.
stant Editor
MacMURRAY
Editor

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

CHARLES GORDON
Western Editor
Old Colony Bldg., Chicago
MERRILL B. KNOX
Editorial Assistant
Old Colony Bldg., Chicago
CARL W. STOCKS
Associate Editor

## CONTENTS

DECEMBER 20, 1924

itorials ..... 1021

**s and Dies to Reduce Shop Costs** ..... 1023
cago Surface Lines uses special tools to make parts on punch sses. These formerly required several hand operations. Auto- c stripping and ejection of the finished parts speeds up pro- tion

**ping Rail Ends in Contact** ..... 1027

**perience with Bolted Joints in San Francisco** ..... 1028
ng 16,000 joints of this type installed by the Market Street lway during the past 13 years the only failures have been a broken rail ends. Redwood ties on rock ballast are used concrete stringers under the rails.

**shion Wheels Tested to Reduce Noise** ..... 1030
JOHN A. DEWHURST.

**proving Railway Motor Bearings** ..... 1031
placing motor frames to make an accurate fit for new simpli- housings and improved bearings the Public Service Railway New Jersey has reduced motor troubles and cut bearing main- nce costs

**rs Operated Over New Concrete Roadbed in 26 Hours** 1035

**e Readers' Forum** ..... 1036

**uipment Maintenance Notes** ..... 1037

**ociation News and Discussions** ..... 1042

**over Conference on Road Safety** ..... 1042
resentatives of all concerned in Street Traffic Society gather ward solution of the accident problem a big impetus by draw- set of principles for guidance of all in developing proper, ade- te and uniform laws and regulations.

**New Conception of the Job** ..... 1044
S. F. FANNON.

**minating Street Car Noises** ..... 1045
R. W. BAILEY.

**dern Methods an Economic Factor in Car Maintenance** ..... 1046
HENRY S. DAY.

**antity Production of Renewal Parts** ..... 1047
H. R. MEYER.

**erican Association News** ..... 1049

**ws of the Industry** ..... 1051

**ancial and Corporate** ..... 1056

**sonal Mention** ..... 1059

**nufactures and the Markets** ..... 1061

**Graw-Hill Company, Inc., Tenth Ave. at 36th St., New York**

es H. McGRAW, President
CER J. BALDWIN, Vice-President
OLM MUIR, Vice-President
MERRESS, Vice-President
N BRITTON, Vice-President
es H. McGRAW, Jr., Vice-Pres. and Treas.
THOMPSON, Secretary

SHINGTON
orado Building
AGO
l Colony Building
ADELPHIA:
al Estate Trust Building
RAND:
nder-News Building
OGUE:
r Building
FRANCISCO:
3 Mission Street
ON:
Bouverie Street, London, E. C. 4

1924

Cable Address: "Machinist, N. Y."
Publishers of
*Engineering News-Record*
*American Machinist*
*Power*
*Chemical and Metallurgical Engineering*
*Coal Age*
*Engineering and Mining Journal-Press*
*Ingeniería Internacional*
*Bus Transportation*
*Electric Railway Journal*
*Electrical World*
*Electrical Merchandising*
*Journal of Electricity*
*(Published in San Francisco)*
*Industrial Engineer*
*(Published in Chicago)*
*Electrical Retailing*
*(Published in Chicago)*
*American Machinist—European Edition*
*(Published in London)*

mber Associated Business Papers, Inc.
er Audit Bureau of Circulations

annual subscription rate is $4 in the United States, Canada, Mexico, Alaska, ii, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, bia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brazil, , Uruguay, Costa Rica, Ecuador, Guatemala and Paraguay. Extra foreign ge to other countries $3 (total $7 or 29 shillings). Subscriptions may be sent New York office or to the London office. Single copies, postage prepaid to any of the world, 20 cents.

ge of Address—When change of address is ordered the new and the old address be given, notice to be received at least ten days before the change takes place.

ight, 1924, by McGraw-Hill Company, Inc.

shed weekly. Entered as second class matter, June 23, 1908, at the Post Office, w York, under the Act of March 3, 1879. Printed in U.S.A.

## *Conversation Lagged*

EARLY one Monday morning the head of a certain railway company was earnestly engaged in conversation with a visitor in his office. Just then the office boy brought in the mail and laid it on the desk.

At the top of the pile was a copy of ELECTRIC RAILWAY JOURNAL, neatly wrapped in its brown paper mailing cover. In an absent-minded way the railway executive tore off the wrapper and unfolded the magazine while continuing the conversation. Then he began slowly turning the pages.

Conversation lagged—in fact, it stopped altogether until every page had been turned and the yellow cover at the back had been reached.

"Excuse me for not giving you my attention," said the railway man, turning again to his visitor, "but I always like to glance through the JOURNAL as soon as it comes, to see what is going on in the industry."

**nber of Copies Printed, 7,225**

**Advertising index—Alphabetical, 56; Classified, 52, 54; Searchlight Section, 51**

# 3 Points to Consider When buying Grid Resistors



**Point 1.** Westinghouse 3-Point Suspension is now recognized as the standard for railway grids.

**Point 2.** Westinghouse Grids are strong, accurately machined and thoroughly tested. Because of their uniform size they are easy to assemble.

**Point 3.** Westinghouse Grids make good Resistors, give smooth acceleration and protect both the car equipment and the car rider from jars and jolts.

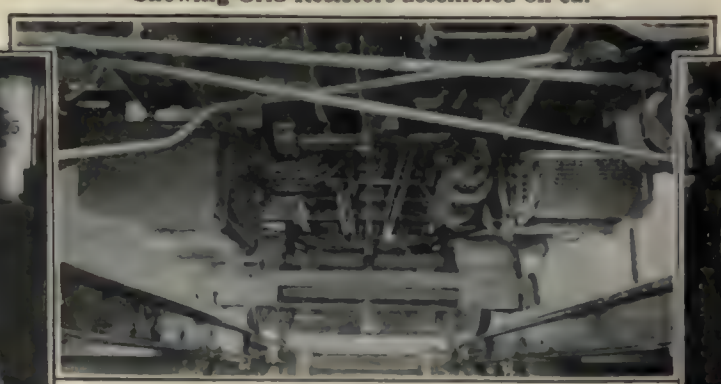
Here are three big reasons why Westinghouse Grids are the best for your equipments.

They are carried in stock in Westinghouse district warehouses for your convenience.

Grinding Bosses parallel



Showing Grid Resistors assembled on car



Testing the Grids



Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of
the United States and Foreign Countries

# Westinghouse

X 78430





# SAFE

The crossing ahead is protected by National Trolley Guard and even if the trolley wheel comes off the wire it will carry on in the energized wire mesh. The passengers are safe!

A National Trolley Guard installation fulfils one of your safety obligations.

The Ohio Brass Co.
Mansfield, Ohio, U. S. A.

OB
TROLLEY MATERIAL

# Add a "VULCAN" Rail Joint Grinder to your equipment



## *It's Reciprocating*

Fits in between the big "Reciprocating" and the rotary grinders. Planes the rail with an abrasive brick. Produces a true smooth rail where joints were uneven. Fine, too, for finishing off after the rotating grinders have removed surplus welding metal. Derails as quickly and easily as our "Atlas"—off-again, on-again, grind-again in seconds. You'll find it a paying investment.

*Get a description and a quotation at the same time*

**Railway Track-work Co.**

3132-48 East Thompson Street, Philadelphia

AGENTS:

Chester F. Gailor, 30 Church St., New York
Chas. N. Wood Co., Boston
Atlas Railway Supply Co., Chicago
Equipment & Engineering Co., London
Electrical Engineering & Mfg. Co., Pittsburgh

359




*Attract attention!*

**Get them on your cars with**

## HUNTER-KEYSTONE SIGNS

Something the prospective passenger can see—and read. A good sign is really a silent salesman of service—it advertises your parks, routes, ball games and other attractions.



*Help them at their stop with*

## FARADAY SIGNAL SYSTEMS

A real convenience for the passenger and an aid to the motorman and conductor. Unnecessary stops are eliminated—yet when the passenger wants to stop, the signal is clear, decisive and unmistakable.




# ELECTRIC SERVICE SUPPLIES CO.

PHILADELPHIA
17th and Cambria Sts.

NEW YORK
50 Church St.

CHICAGO
Monadnock Bldg.

PITTSBURGH
629 Oliver Building

SCRANTON
316 N. Washington Ave.

BOSTON
88 Broad St.

Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver




# Double-Duty Poles Help Everybody!

***ELRECO Combination Railway and Lighting Poles*** help the street railway, in the first place, by reducing its investment in span-wire poles ONE HALF.

Help the lighting company by enabling it to share the use of these poles with the traction company.

Help the municipality by clearing the streets of the usual jungle of poles, lighting standards and wires—and greatly improving the appearance of the streets. A more efficient lighting system is assured also.

ELRECO Poles are the most adaptable steel poles made for joint railway and lighting service. No other form, style or shape of pole offers so much for the money invested.

*Ask us to prove it!*

**The Electric Railway Equipment Co.**
**Cincinnati, Ohio**
**New York Office: 30 Church Street**

## ELRECO —POLES—





# *Concentrated effort!*

BY adhering strictly to one exclusive line of equipment—door operating devices—a product has been built-up which holds unchallenged leadership in the field. All our efforts, all our energies have been devoted to making National Pneumatic Door Engines as nearly perfect as it is possible for mechanical apparatus to be.

This accounts for the long life, the low maintenance, and the continued smooth operation after years of service, which characterizes N - P Equipment everywhere it is installed.

**National Pneumatic Co., Inc.**

*Originators and Manufacturers*

***Executive Office:* 50 Church Street, New York**

Philadelphia—1010 Colonial Trust Bldg. Chicago—940 McCormick Bldg.
General Works—Rahway, New Jersey

*Manufactured in Canada by Dominion Wheel & Foundry Co., Ltd, Toronto, Ont.*





# Low-Maintenance Air Compressors

*for*

**POWER HOUSES, CAR BARNS, and SHOPS**

The above illustration shows three of a battery of eight 3-VS high pressure compressors being used by a large street railway company.

Westinghouse-National Air Compressors are noted for their fine construction, their smooth, steady, economical service, their reputation for practically never wearing out, and their low maintenance requirements.

Many of these Compressors built 15 and 18 years ago are still giving first-class service.

Users of Westinghouse-National Compressors not only enjoy long service and low upkeep, but they also realize a saving in operating power through the HP Automatic Control, which stops the machine when sufficient pressure has been built up, and causes the Compressor to remain at rest until a new air supply is needed, when operation is resumed. No power is wasted.

**Westinghouse Traction Brake Company**
**General Office and Works: Wilmerding, Pa.**

# WESTINGHOUSE—NATIONAL

"QUALITY MACHINES FOR QUALITY SERVICE"




# Chassis *and* Bodies

## The finished job from one responsible builder

There is no division of responsibility when you buy Fifth Avenue Buses. You *know* that the bodies will be O.K. in every way, and that they will be adapted properly to the chassis for which they are built.

Every unit that goes into a Fifth Avenue Bus is thoroughly tested. Our system of inspection is complete in every detail. Fifth Avenue Buses are built in our own shops from the ground up. Every bolt and screw is affixed under Fifth Avenue supervision. Our road test is supervised by men who have been identified with motor-bus development for more than a decade.

The design and construction of Fifth Avenue Buses, chassis and bodies is predicated on long years of actual experience operating this same kind of buses and keeping them in repair.

You have an opportunity to buy buses of known value, buses with a reputation established many years, buses built complete in the Fifth Avenue Shops under the Fifth Avenue organization.

***Others have found that it pays.***



### FIFTH AVENUE
### Type L

Fifth Avenue double-deckers because of the minimum amount of street space occupied per seated passenger, are the most practical multiple automotive all year round carriers on the market today.

Our L-Type buses provide seats for 55 passengers. This has been accomplished without lengthening the wheel base of the bus.

And the practical all-weather adjustable top, makes them 100% serviceable the year round.

MEMBER AERA

**NEW YORK TRANSPORTATION CO.**
*New York, N.Y.*


Catch the late
ORPHEUM
THEATRE
JOLSON

# eatre crowd— with *Buses*—

Bus flexibility offers a simple and effective solution to the problem of handling late theatre crowds at minimum operating cost.

For while continuous service on a fixed schedule must be maintained to provide adequate trolley facilities, a bus or fleet of buses can assemble at convenient points, fill up to capacity, and then express to the residential districts where most passengers alight.

Mack Bus economy and rockbottom maintenance makes such auxiliary service doubly profitable. Every Mack bus feature from bumper to tail light is an *all-bus* feature, designed and built to meet the strenuous conditions that day in and day out bus operation imposes.

Engine is force feed and splash oil system type. Counterbalanced case-hardened crank shaft. Light reciprocating parts.

Tread is wide,—a safety measure and a real factor in easy handling of the long wheelbase. Dual reduction rear axle is strictly a bus axle, designed to give maximum ground and underbody clearance with straight line transmission.

Mack Bus Engineers will gladly discuss the rest of the story.

MACK TRUCKS, INC.
INTERNATIONAL MOTOR COMPANY
25 BROADWAY NEW YORK CITY
Eighty-three direct MACK factory branches operate under the titles of: "MACK MOTOR TRUCK COMPANY" and "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION."

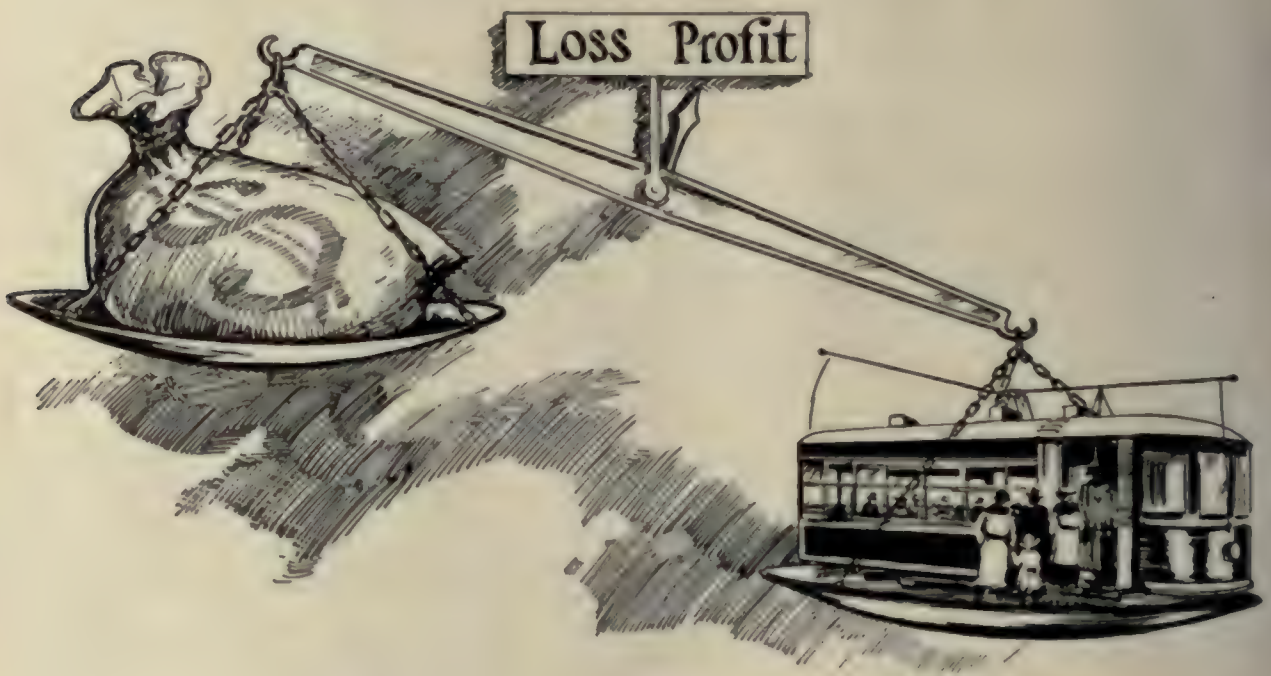
# The Mack Bus



25 Passenger, City Type

## Performance counts!

# TURN LOSS INTO PROFIT




with

# SAFETY CARS



**SAFETY CAR DEVICES CO.**
OF ST. LOUIS, MO.

*Postal and Telegraphic Address:*
**WILMERDING, PA.**

CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH



# *Poles that Resist the Elements*

The heaviest storms or severest strains have no effect upon Truscon Steel Poles. Their reinforced steel construction, with four rigid corners, result in poles that are particularly strong to resist loads and give the maximum of service. When stressed to the failure point they will bend, but never break.

Truscon Steel Poles have no pockets for collection of water or dirt with the added dangers of rust or corrosion. The poles are easily inspected and painted.

Their fireproof qualities, low maintenance costs and long life make them the most economical in the end.

They are made in a variety of styles and sizes for many needs and their attractive design adds to any section in which they are used.

***Return coupon for free copy Truscon Steel Pole booklet.***




TRUSCON STEEL COMPANY, YOUNGSTOWN, OHIO

*Warehouses and Sales Offices from Pacific to Atlantic*
*For addresses see phone books of principal cities*
*Canada: Walkerville, Ont. Foreign Div.: New York*

# TRUSCON STANDARD STEEL POLES

**Truscon Steel Company, Youngstown, Ohio**

Please send me your booklet "Truscon Steel Poles."

Name .....

Address ..... E.R.J. 12-20




## ADAPTABILITY

★ The wide adaptability of Bates poles makes them applicable for every pole purpose.

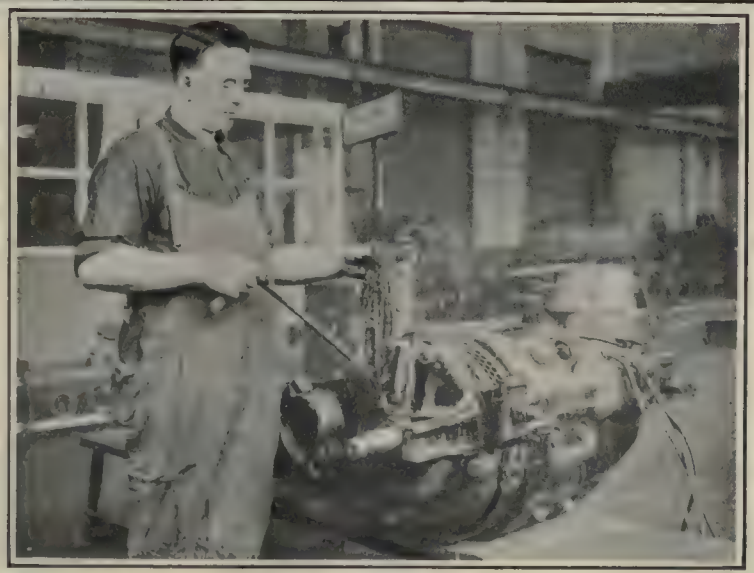
They readily and economically adapt themselves to fabrication into combination poles, towers, A frames and H frames—and for substation construction. As trolley supports, for signal tower use, as transformer rack frames, and as street light standards—they are used to advantage.

Get a Bates quotation for consideration and comparison!

Bates Expanded Steel Truss Co.
Illinois Merchants Bank Bldg.
Chicago, Ill., U. S. A.

BATES ONE PIECE EXPANDED STEEL POLES

# Galena Oils and Service



## Doing it right!

### How?—When?—Where?—and What?

Four fundamental questions in electric railway lubrication problems!

On the correct answers to these questions and the efficient execution of the policies laid out, depend nearly the whole structure of truck and motor bearing maintenance costs.

Galena Lubrication is more than oil alone. It is oil plus experience plus service. Each of these factors is essential to good results. With the best of oils as a base, Galena applies a lifetime of experience to produce the right lubricant to fit each condition and then through Galena Service insures its proper employment.

Galena Lubrication always results in increased availability of equipment, fewer delays and lowered maintenance cost.

## Galena-Signal Oil Company

New York - Franklin, Pa. - Chicago

and offices in principal cities

**Standard for Modern G-E Motors as follows**

| | |
|---|---|
| GE-201 | GE-260 |
| GE-203 | GE-263 |
| GE-210 | GE-264 |
| GE-240 | GE-265 |
| GE-247 | GE-275 |
| GE-258 | |

**—and available for these G-E Motors**

| | |
|---|---|
| GE-57 | GE-73 |
| GE-67 | GE-80 |
| GE-70 | GE-88 |




*Don't purchase supplies at random. Use your G-E Catalog*



# A Renewable Carbon-way

Do you replace worn brush-holder carbon-ways promptly as you should? Or do you continue operation with the worn part and risk a higher motor maintenance cost?

Many railway motors now in service have worn brush-holders that should be replaced. Replace them now with the new G-E Renewable Carbon-way Holder. Then in the future just the carbon-way, the worn part, can be renewed at about one fifth the cost of replacing a complete holder.

Quite a saving. And remember, the other results will be fewer motor failures and better service.

**General Electric Company**
Schenectady, N. Y.
Sales Offices in all Large Cities

GENERAL ELECTRIC

New York, Saturday, December 20, 1924

# Electric Railway Journal

*Consolidation of Street Railway Journal and Electric Railway Review*

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

*Volume 64*
*Number 25*

## loover Safety Conference a Great Constructive Success

A FORCEFUL, constructive influence, looking toward early relief from the terrible toll of life in street nd highway accidents, has been set in motion by the ational Conference on Street and Highway Safety held Washington Dec. 15 and 16. The conference on this ressing problem was called by the Secretary of Comerce, Herbert Hoover. He personally acted as chairan during a large part of the deliberations, and the asterful way in which the meetings were conducted nd the high character of the work accomplished pay ibute to his great ability as organizer and doer.

It was no small matter to bring together representaves of the many interests concerned from practically very state in the Union, with all their conflicting and ivergent views on the subject, and work out of this haos in two days time a distinctly constructive statement of remedial measures having the whole-hearted approval of so large and representative a conference. It as something of an accomplishment even to get some the interests together around a common table to diss this problem. But the preliminary work done in ght committees, the expression of opinion on the committee reports at the first day's sessions, the harmonizg of the views expressed and the compilation of the arious recommendations into a consolidated report, and en adoption of this report, section by section, by the hole conference on the second day, constitute a truly reat accomplishment.

As finally approved, the recommendations of the conrence form a program which all interests can indorse nd apply. In some details, it may not satisfy one party another, but it represents a point of view arrived at fter long and careful deliberation by men of highest anding in their own industries and representing all terests concerned. The personnel of the committees nd the backing of the federal government give the eport a stamp of authority and distinction which should ommend it to the careful consideration of all public ficials, the railways, the automotive industry and all ghway bodies and safety organizations. It will go a ng way toward securing the uniformity of regulation d practice throughout the country so sadly lacking now, hile avoiding federal regulation in the matter.

Chief among the recommendations of interest to inrurban electric railways is that calling for legislative tion requiring motor vehicles to come to a full stop at rtain railway crossings and putting the responsibility the hands of the state commissions to designate the ade crossings to which the law is to apply and so to ark them. The proposal of a stop law caused more ebate than any other point raised. The railroads naturally want indorsement of the full-stop law without qualification. The final wording, however, is a sensible compromise. The plan adopted, if applied, will doubtless go a long way toward taking the burden of responsibility off the railways, and, what is far more important, toward material reduction in grade crossing accidents.

Street railways are also much concerned directly and indirectly with many of the provisions of the conference report. They will find that they can indorse and help along adoption of the whole program urged. The report is reviewed in another part of this issue, but electric railway men will do well to write to the Department of Commerce, Washington, for a copy of the complete report for study and application, and to support it in a broad way in their own communities.

## Definite Limits of Wear Promote Good Maintenance

IN NEARLY all maintenance work the subject of economy is uppermost in the mind of the man in direct charge—and of his superiors also for that matter. Constant effort and attention is directed toward obtaining increased life from the various parts of the equipment without getting excessive road failures. At the same time it is desirable to get the work done at minimum labor cost.

Sometimes, however, the constant pressure for economy causes the ultimate result to be lost sight of when striving for immediate savings. There is a natural tendency in the attempt to get every possible mile of wear out of each part of the car equipment. The desire to "make a showing" in immediate costs may lead to badly run down equipment and poor service.

This shows up strikingly in connection with the replacement of bearings and similar parts that must be periodically renewed and that run into considerable cost. On many properties there seem to be no definitely established limits of wear, and it is questionable whether on many others that do have generally understood limits they are actually lived up to.

An important step toward better maintenance practice will be taken when maximum wear limits are definitely established for all important wearing parts and are then rigidly adhered to. Even though a limit is established and later found to be too high or too low, it can be readily altered and maintenance forces instructed accordingly. But some limit should be established, and when the part becomes worn to that point it should be taken out. In that way only can uniformly good results be obtained.

**This is the issue in December that is devoted essentially to maintenance subjects**

## He Knew When It Was Time to Throw a Machine Away

THAT it very often pays to spend money in order to save money is illustrated by the experience of a master mechanic who recently replaced a still serviceable power-driven hacksaw by one of more modern design. When the suggestion that this be done was originally made to the management of the railway in question, it occasioned some surprise. At first thought it appeared to be an extravagance to throw away one fairly good saw and buy a new one.

But this master mechanic had made a study of machine tools, and he was ready with his argument. He showed the management just how money could be saved by installing a better machine. In this case the better machine was primarily a quicker machine, and at present rates of wages any machine that saves time will soon pay for itself. So, he argued, instead of being an extravagance to install a new machine, it would really be an economy.

The management of this railway is always on the lookout for ways of legitimately reducing expenses. Moreover, the master mechanic was known to be a man with long experience at his work and having sound common sense. So a new high-speed saw was bought and installed in the shop. Its performance soon justified the expense. For example, it reduced the time required to cut through a steel axle to one-tenth the former time. The life of the saw blades was practically quadrupled.

Opportunities to make changes of this kind exist in nearly every railway shop. For thus being able to visualize the possible savings to be effected by throwing away an old machine this master mechanic deserves great credit. Equal credit is deserved by the management which listened with an open mind to his argument and was willing to put the proposal to the test.

## Riding Comfort May Have a Stronger Appeal than Cheapness

DRIVING down by automobile from the house to the office is a pretty cold proposition these winter mornings. The wind howls and the snow sifts in through every small opening. An icy covering makes the pavement treacherous. If the old bus stands parked all day and gets snowed in, it may require a half hour's delay and use up the best robe under the wheels to get backed out and headed homeward. On the other hand, riding in the street car is comfortable and warm and safe and convenient.

An appeal to the automobile driver based on some such argument as the foregoing is likely to be effective at this season of the year. This idea was tersely put by Labert St. Clair in a telegram to the Pennsylvania Street Railway Association Convention at Harrisburg on Dec. 5, which was reported in this paper last week. In it he said, "Make the comfort of street car riding rather than the cost of running an automobile the basis of appeal to automobile owners."

That does not mean, of course, that the well-known slogan "Ride the street car and save the difference" is not effective. Its value has been proved by experience in many places and undoubtedly it has influenced a large number of people to ride the railway. But the average American automobile owner is more influenced by comfort and convenience than by cost. He will spend money freely to get what he wants. If he can be convinced that it is more convenient and comfortable for him to ride downtown in the street car than it is to get his automobile out of the garage and drive down, that is more apt to appeal to him than the fact that he is saving 10 or 15 or 50 cents.

Then, too, the economy argument is no longer new to the public in some cities, and novelty is one of the most important requirements of effective advertising. Skillfully worded publicity emphasizing the comfort feature might be more effective now than that which stresses primarily the cheapness of riding the street car.

## A Subway Is an Expensive Luxury

IT IS a striking fact that in nearly every large city in the country there is a tremendous demand for subways. This applies notably to the two largest cities, New York and Chicago, but in Detroit, Philadelphia, St. Louis and other cities subway construction, or additions to the present systems, is being strongly advocated by many citizens.

This desire is understandable with the congestion of traffic on the surface of the streets, but the public should realize that subways are a very expensive luxury and that the cost of building them, like the price of many other desirable things, has gone up greatly during the past 10 years. This is shown in the estimated cost figures given out last week in New York for the Mayor's proposed subway between the southerly end of Manhattan and 193d Street. For one of the downtown sections of this line—0.83 route-miles in length—the cost is estimated at more than $25,000,000 per route-mile and the figure for the entire length of the division south of 64th Street—10 route-miles—is given as $114,000,000. This amounts to $11,400,000 per route-mile. Part of this section is two-track, part four-track and part six-track, there being 36.32 track-miles to the 10 miles of route. These cost figures are exclusive of all equipment or of shops, or of any land or easements.

For the section north of 64th Street and as far as 193d Street, the cost on the same basis is estimated at about $8,040,000 per mile of route, there being 6.65 route-miles and 24.95 track-miles. The reduction in these figures from those for the downtown section is due, of course, to less arduous conditions of construction.

Some of the factors which have an important bearing on the cost of building subways are narrow streets with high buildings, especially where this condition is combined with soft subsoil, extent of other substructures in the street, whether the subway is under water level, and the extent of the street congestion over the proposed construction. The latter condition affects the cost of receiving materials and the disposal of the refuse.

Most of these factors are present to some extent in the 0.83-mile downtown section of Manhattan, where the proposed line would have to cross under two subways of the Interborough Rapid Transit Company and one of the Brooklyn-Manhattan Transit Corporation, where much underpinning of these and other structures would have to be done, and where there is not much room for carrying on the work. Above 64th Street, conditions for construction are more favorable and this fact is reflected in the price. But, in general, it may be said that the cost of subway construction has considerably more than doubled since 15 years ago, when a rough estimate for the building of a two or four-track subway was $1,000,000 per single track mile.

# Jigs and Dies to Reduce Shop Costs

**Chicago Surface Lines Uses Special Tools to Make Many Parts in Punch Presses—These Formerly Required Several Hand Operations—Automatic Stripping and Ejection of the Finished Parts Speeds Up Production**

N THE West Shops of the Chicago Surface Lines many dies and jigs have been developed to hold down the cost of making replacement parts for car uipment. As a result, the number of hand operations s been reduced to a large extent and the punch press s been substituted for hammer, saw, file and drill ess. These special tools have been made up from time time over a number of years, the high wage scales evalent in Chicago being an added incentive. Alough many different types have thus been developed, ch expenditure for new dies is carefully supervised d the cost of a proposed new tool is compared with e estimated saving to be de before the work is thorized.

An endeavor is made to oid the tendency in rail- y maintenance practice manufacturing parts that l be purchased cheaper m other sources. In some es, however, the decision determined by the time ment in delivery. Special rts that are required in mparatively small quanti- s frequently cannot be purchased at an attractive ce except in large lots. Consequently the cost of rrying large stocks of such parts sometimes makes it irable to manufacture them in the shop. Since punch ess dies can be set up quickly in the machines, it is ssible to manufacture comparatively small lots of spe- l parts at prices that more than justify the cost of king up the dies.

The punch press equipment available was originally rchased for maintenance purposes and is not particu- ly suited to quantity production. It consists mostly comparatively slow, heavy-duty machines. With e exception of one motor-driven V. & O. Press Com- ny No. 21 punch, these are nited to a Williams, White Company No. 14 press, Long & Allstatter combined nch and shear and one ner heavy-duty, deep-throat nch. The various types of es and jigs that have been signed increase the service tained from these ma- ines. Since there is noth- g unusual about the ma- ine equipment available in these shops, the tools to be scribed are of types that can be utilized with the achines found in most railway shops.

In the accompanying illustration, Fig. 1, is shown die for making push-button bushings for the pas- nger signal bells on a comparatively large group of rs. This particular type of signal is no longer on the market, and repair parts are therefore not available from the original manufacturer.

The bushings are made of thin brass tubing, with a bead rolled on one end to protect the passengers' fingers. They are first cut off in a screw machine and the bead is then rolled by the punch and die shown in the illustration. The piece of tubing of proper length is slipped on the pin (*a*) projecting from the sliding member (*b*) shown in the illustration. This slide extends out to the right from the body of the die to form a handle at (*d*) which can be grasped by the operator. When the slide is pulled out to the extreme right the pin (*a*) is exposed so that the piece of tubing can be readily dropped into place. The sliding member is then pushed to the left until it strikes a stop. This places the bushing between the two halves of the split forming die (*e*), shown open in the illustration. This is held open by compression springs and is arranged so that the two halves of the die are free to slide in the die block. When the punch, shown at the left, descends, the two heavy lugs (*g*) engage tapered outer faces on the split die (*e*), and as the punch comes down into position the two halves of the die are brought together so as to clamp securely the bushing between them. The top of the bushing is rolled by the punch (*f*) in the center. When the punch is raised from the die the two split members are forced apart by the compression springs mounted between them, thus releasing the bushing and the hand-operated slide (*b*) so that the latter can be pulled to the right by hand. When this is done the newly rolled bead on the top of the bushing engages the two inclined surfaces (*c*), and as the sliding member continues toward the right the bushing is automatically drawn off the pin, so that another piece of tubing can be quickly dropped in place, and the operation repeated. This job is carried out on a V. & O. Press Company No. 21 motor-driven punch at the rate of approximately 2,000 pieces per hour.

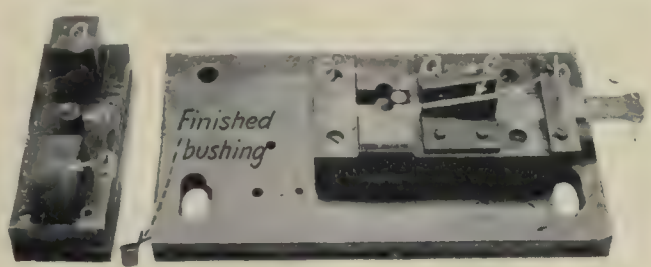



**Fig. 1. Die for Rolling Bead on Push-Button Bushings**

The pieces are stripped by pulling the handle at the right, which causes the bead on the bushing to engage the inclined surfaces at (*a*).

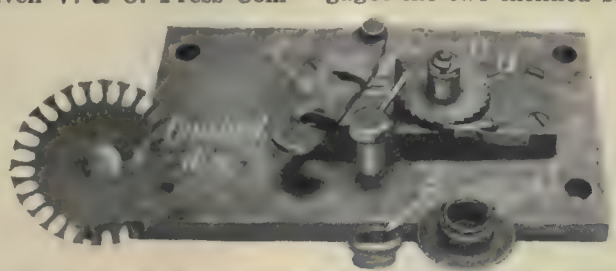


**Fig. 2. Equally Spaced Slots in Fish Paper Insulating Disks for Fan Motor Armatures Are Cut in This Indexing Die**

A good example of an indexing die for making a number of equally spaced cuts in a single piece of material is shown in Fig. 2. This is used for cutting the slots in the circular fish paper insulation used in small ventilating fan motor armatures.

The round disks are first blanked out of sheet material. The slots for the windings are then cut in the

die shown. A disk is slipped over the spindle (*b*) and the guard (*f*) is fastened in place to act as a stripper. The collar (*d*) is then slipped on the spindle (*b*) and the cap (*e*) is placed on top. This cap is provided with a projecting pin on the inside which enters the vertical slot near the top of the spindle (*b*). By pressing down on this cap the spring inside the collar (*d*) is co pressed. The cap (*e*) is then given a partial turn that its pin engages the circumferential slot shown ne the top of the spindle (*b*), thus holding the collar ( securely in place and clamping the disk of fish pap on the ratchet wheel (*a*). The various parts just d scribed are all clamped together through the action the spring inside the collar (*d*), but are free to rota about the vertical pin in the center of the spindle (*b* A spring engaging the notches in the ratchet (*a*) lows it to be rotated by hand, one notch at a tim corresponding with the spacing of the slots to punched in the disk. As the piece is rotated, it is th indexed to give the required number and spacing slots. The work is done in a Williams, White & Co pany No. 14 power punch press at the rate of 25 co plete disks per hour.

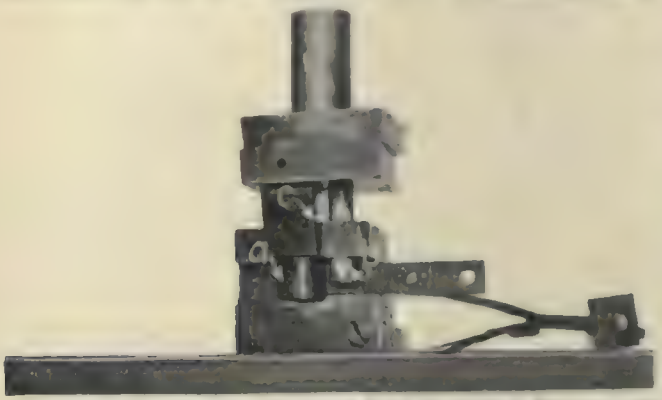


Fig. 3. Burning Tips Are Removed from Controller Fingers with This Equipment, Which Holds the Finger in Place While the Punch Shears Off the Worn Tip

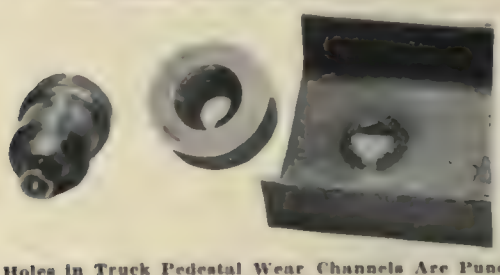


Fig. 4. Holes in Truck Pedestal Wear Channels Are Punched and Slotted at One Time with This Simple Equipment

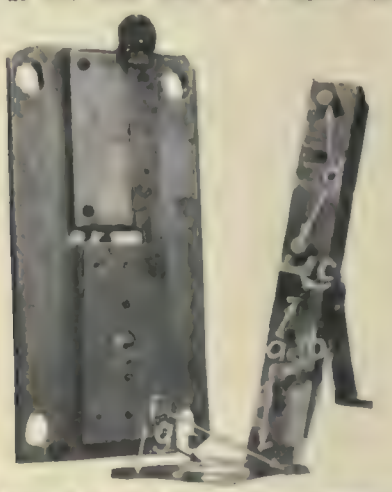


Fig. 5. Car Ribbon Fuses Are Made by a Continuous Process
The two pieces of ribbon are fastened together, the center calibrating hole is punched and the finished fuses are cut to the proper length.



Fig. 6. Case-Hardened Wear Plates Are Bolted to Projecting Ears on Journal Boxes. The Pieces Are Cut to Proper Shape in a Punch Press

A punch and die for the removal of burning tips controller fingers offers an excellent example of t substitution of machine for hand operations in salva ing worn parts. This tool, shown in Fig. 3, is design so that a projecting pin (*b*) on the punch pass through a hole in the die block to hold the finger curely in place while the punch (*c*) cuts off the burni tip (*a*). The condition of the two parts after the has been removed is shown at the right side of t illustration. The finger is then ready for a new t This work is done in the V. & O. Press Company No. punch press at the rate of about 2,000 pieces per hour.

The simple punch and die shown in Fig. 4 is us to make countersunk slotted holes in 4-in. structur channel wear pieces for truck pedestal jaws. On th particular type of truck the wear pieces are held place with countersunk head carriage bolts which ha a lug at one side to prevent the head of the bolt fro turning while the nut is being pulled up tight. will be seen from the illustration, the punch not on cuts and countersinks the hole, but also forms the sl to take the projecting lug on the carriage bolt. Th work is done on a heavy-duty power punch press at t rate of about 200 holes per hour.

## CAR RIBBON FUSES MADE COMPLETE

In Fig. 5 is shown an ingenious die for making c ribbon fuses from thin strips of copper. The copp ribbon is purchased in rolls 1 in. wide and 0.005 thick. Two of these thicknesses of material are fas ened together and a calibrating hole is punched in t center, to form the complete fuse, as shown at the bo tom of the illustration. This has been pulled apart show the two ribbons of copper. The entire operati of making these fuses is completed in the die shown. a continuous process. The two ribbons of material a fed into the die from two different rolls. The proje ing prongs (*a*) on the die pierce the two strips copper in such a manner as to leave a projecting burr two points spaced so they will come near each end the completed fuse. At the same time the center ho (*g*) is punched in the ribbon. As the material pushed forward again in the die, against a stop whi fixes the proper length, the two projecting punches ( flatten the burrs that were made at (*f*) so as to fast the two pieces securely together. At the same time t descending cutter (*c*) cuts the completed fuse off to t proper length. The operation is then again repeate This work is done in the V. & O. Press Company No. press at the rate of about 3,500 complete fuses per hou

A heavy cutting die for blanking out the irregula

ped journal box wearing pieces shown in Fig. 6 is d in a Williams, White & Company No. 14 press. In s case it is necessary to make two cuts to complete work, the piece being turned around after the cut one side has been made. The material is ⅛-in. sheet el and is later formed and punched to complete the aring pieces. These are made up so that they can be ted to projecting ears cast on the sides of the journal es. The jig for punching the holes in the ears after piece has been formed is shown in Fig. 7. This is interest chiefly because of the complicated shape of piece to be punched. It will also be noted that eral sets of holes in the jig permit it to be used for ching wear plates for different-sized journal boxes.

### Several Types of Forming Dies Used

Two forming dies of widely different types are illustrated in Figs. 8 and 9. The one shown in Fig. 8 is d for the manufacture of the small eye-bolts shown the bottom of the illustration. This is part of the fuse box assembly and is made up cold from ⅝-in. nd, cold rolled steel. The pieces are sheared to the per length and are then formed in four operations. e successive stages of the forming are carried out in er on the four sections of the die marked, respecly, (*a*), (*b*), (*c*) and (*d*). The piece is moved m one position to the other in the die so that it uires four movements of the press to complete the ration. In the first position (*a*) the rod is kinked at one end. In position (*b*) this kink is depressed as to bring the stem approximately at the center of loop. In positions (*c*) and (*d*) the loop is finally pleted. The work is done in a Williams, White & mpany No. 14 press at the rate of 75 pieces an hour. Brass channel wearing pieces used to reinforce the es of body sash are formed from No. 18 gage strips the proper width in the punch and die shown in . 9. The completed channel is shown at (*c*) in the stration. The punch and die shown are used to m the channel only, the screw holes and cuts for the h locks being made in a second die that is not shown. the Williams, White & Company No. 14 press these formed at the rate of approximately 40 per hour. An excellent example of a die which substitutes ching operations for what would ordinarily be a l press job is illustrated in Fig. 10. The large es in the channels that are used as wear pieces on ck pedestals are punched instead of being drilled. e block (*b*) in the die supports the web of the chanso that it can be punched without distorting the ges. These channel pieces are also sheared to the per length in a similar die designed to support the ce, so that both the web and the flanges are cut off n. Both 14-in. and 16-in. lengths of channel are uired for different types of trucks, and an adjuste pin at the left of the die shown in Fig. 10 enables same die to be used for punching pieces of either gth. The punching is done in the Williams, White ompany No. 14 press at the rate of 60 pieces per hour.

### Die Locates Holes from Center Punch Marks

n most railway shops the punching equipment is suitable for making a number of holes in small uctural members which have been laid out with cenpunch marks. This is due to the fact that such ch press equipment is usually of the rotating type, which the punch stops in a raised position, making difficult to locate the center punch so that the hole be in exactly the proper position. The device shown in Fig. 11 was designed to make an ordinary punch press suitable for such work. When set up in the machine the end of the pointer (*a*) corresponds



**Fig. 7. After Forming, the Wear Plates Shown in Fig. 6 Are Punched in This Jig**

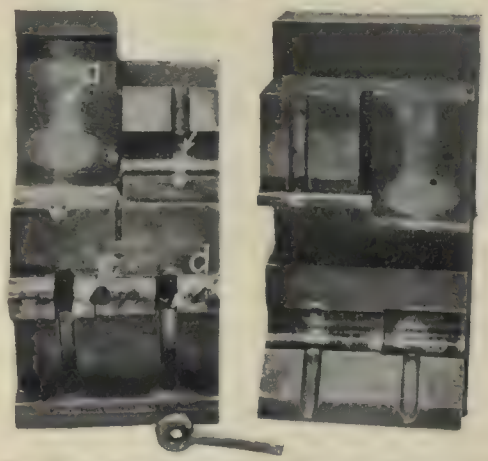


**Fig. 8. The Piece Shown at the Bottom Is Formed Cold from 5/16-in. Round Stock in Four Operations**

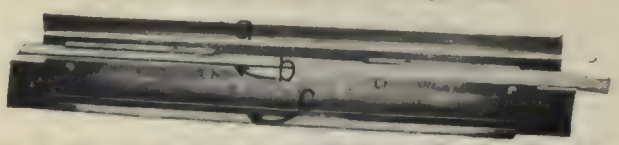


**Fig. 9. This Die and Punch Are Used for Forming Brass Sash Channels from No. 18 Gage Material**

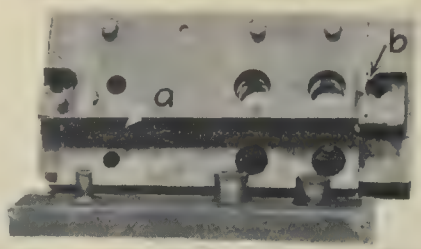



**Fig. 10. Die for Punching the Large Holes in Webs of Truck Pedestal Channel Wear Pieces at a Substantial Saving Over Cost of Drilling**




**Fig. 11. Die for Punching Holes in Structural Members**

The difficulty of working from center punch marks when using an ordinary type rotating press is overcome with this ingenious die, which contains a pointer for locating the position of the hole. The pointer is forced aside as the punch descends and returns to position when the punch is raised from the work.

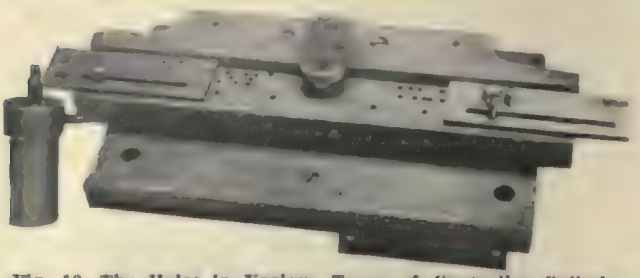


Fig. 12. The Holes in Various Types of Controller Cylinder Segments Are Located in This Adjustable Jig

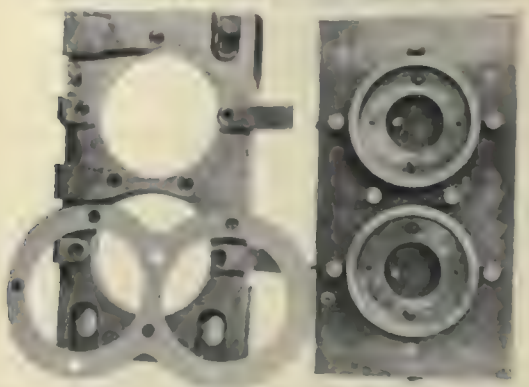


Fig. 13. Compressor Cylinder Head Gaskets Are Punched from Several Thicknesses of Material

exactly with the center line of the punch (*e*). When the work is moved, so that the end of this pointer coincides with the center punch mark locating the hole to be made, the punch itself will descend in the proper position. The pointer in the die is carried on the end of a cross slide having a slot near the rear end at (*b*). This slide is normally held in the forward position against a stop by the spring (*c*) which is stretched across the back of the die, and presses against the slide. A wedge (*d*) carried on an extension back of the punch enters the slot (*b*) as the punch descends and forces the slide back so as to move the pointer out of the way while the hole is being made in the material. As soon as the punch is again raised the pointer (*a*) returns to



Fig. 14. This Is Another Type of Gasket Die, Which Is Similar in Construction to that Shown in Fig. 13

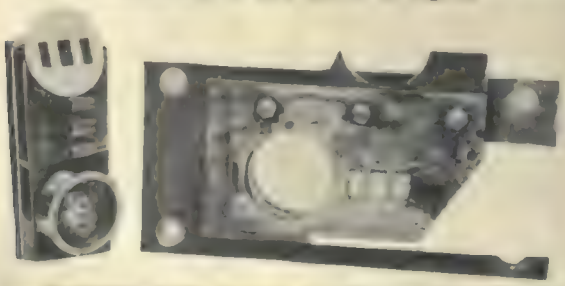


Fig. 15. Engineer's Valve Gaskets Are Punched from Sheet Material in a Continuous Process. The Punch Is Made in Two Parts So that Each May Be Used Separately if Desired

its normal position and is ready to locate the next hol

To make up different dies or jigs for each of a larg number of similar parts which vary slightly in siz and position of holes becomes a very expensive matte In Fig. 12 is illustrated an adjustable jig which indexed so that a comparatively large number of simila parts of varying dimensions may be all punched on th same piece of equipment. This is used for punchin the holes in controller cylinder segments before the are formed. Pins in the slides at each side of the ji are dropped into holes corresponding to the position indicated by the various scales which are laid out t locate the holes for various types of controllers. In thi one jig all the various plates used on K-51, K-35 an K-28 controller cylinders are punched. The hole at eac end of the piece is punched separately, the right an left hand sides being adjusted so that the piece is move first to one side and then to the other. The work is don at the rate of about 1,000 pieces per hour in the V. & O Press Company No. 21 power punch press.

Three different dies for punching gaskets are illus trated in Figs. 13, 14 and 15. The one shown in Fig. 1 is used to punch the bolt holes and the inside contou for compressor cylinder head gaskets after they hav been blanked out on another die. That shown in Fig. 1 is very similar and is used for the outside cylinde




Fig. 16. The Controller Finger Part Shown at Bottom Is Punched and Formed from Brass Strips of Proper Width. An Ejecting Device Removes Finished Piece as Punch Is Raised

head gasket. The equipment in Fig. 15 punches engi neer's valve gaskets from strips of material in a con tinuous process. The three rectangular holes ar punched in the piece first and the gasket is then blanked out on the second descent of the punch, while at the same time the holes for the next gasket are being made The punch is made in two parts so that one or the othe part may be removed and the tool used for either opera tion separately. All three of the dies shown in Figs 13, 14 and 15 are used on the V. & O. Press Company No. 21 punch press. The cylinder gaskets are made at the rate of about 500 per hour by using several thick nesses of material at a time, while the engineer's valve gaskets are turned out at the rate of approximately 3,500 per hour.

In Fig. 16 is shown an ingenious arrangement for ejecting a small piece of work after it has been punched out and formed. By thus automatically ejecting the completed pieces the production is very materially in creased, as the material is fed in continuously and the

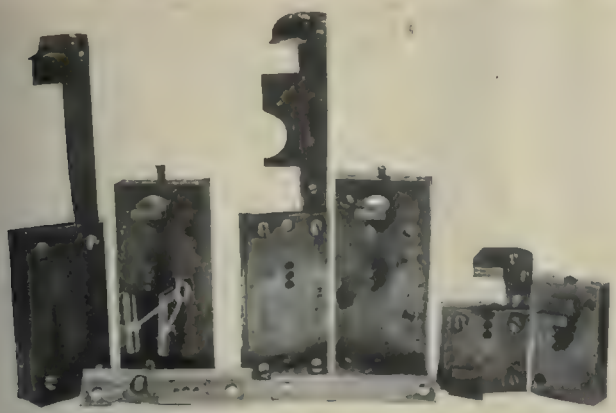


Fig. 17. Several Types of Forming and Punching Dies Are Used for Making the Various Parts of Controller Fingers

press operated at top speed. The part manufactured consists of a small brass strip, slightly curved at one end and having a hole punched near the other end, as shown near the bottom of the illustration. This is one of the pieces making up a controller finger assembly and is manufactured from strip brass of the proper width and thickness.

As the material is fed into the die the hole is punched first and the piece is then cut off to the proper length and formed to the proper shape while the hole is being punched for the next piece. The cutting edge is at (*a*) and the forming die at (*b*). After forming, the completed piece is left in the bottom of the die and it is necessary to eject this before the next piece is cut off. As the punch descends, the finger (*c*) enters the opening at (*d*) to force the U-shaped ejector out of the way of the forming punch (*b*). As this ejector is moved back the small spring (*e*) is compressed and the latch (*f*) drops into a notch, thus holding the ejector back in position. While the above action is taking place the hook (*h*) slips below the secondary latch (*g*). The piece of work, in the meantime, has been cut off and formed and lies in the bottom of the die. As the punch ascends again the hook (*h*) trips in turn the secondary latch (*g*) and the latch (*f*), releasing the ejector (*d*), which, under the action of the spring (*e*), snaps the completed piece out of the bottom of the die. The operation is repeated as the punch descends on each stroke. These pieces are made at the rate of 3,000 per hour in the V. & O. Press Company No. 21 press.

A group of three dies used for forming the various parts of K-35 controller fingers from strip brass and bronze is shown in Fig. 17. The completed pieces are illustrated at the bottom of the illustration. In addition to cutting off and punching, the die at the left also cuts the outside contour of the piece to the proper shape as shown at (*a*). This cut is made by the cutting edges (*b*) on the punch at the same time that the holes are being made. All of these parts are made continuously from strips of material fed into the dies and a production of approximately 3,000 per hour is obtained in the V. & O. Press Company No. 21 press.

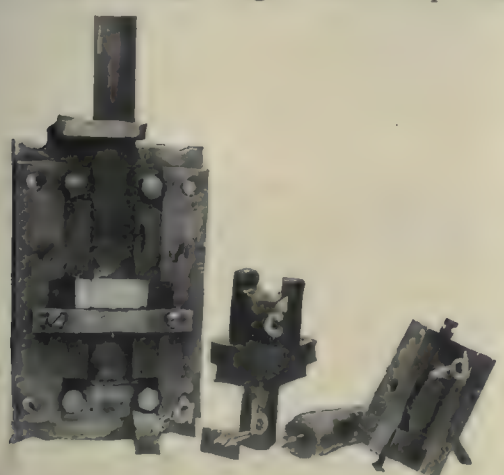


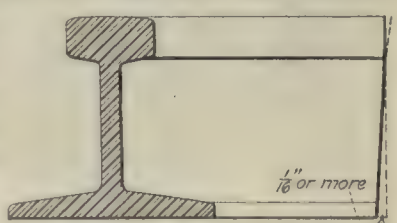
Fig. 18. Short Controller Segments Are Sheared from Formed Copper Bars and Holes Are Punched Radially in Die Shown at Right

Short controller cylinder segments are cut with the equipment shown in Fig. 18 from copper bar formed to the proper contour. The pieces for the segments are sheared from the formed bar with the punch and die shown at the left of the illustration. At the right is an interesting type of die used for punching the two holes in these pieces. The holes must be radial rather than parallel, and in order to accomplish this the piece is moved first to one side and then to the other in the curved slot in the die.

# Keeping Rail Ends in Contact

### Milling in a Plane Perpendicular to the Longitudinal Axis, and Undercutting the Web and Base to Produce Better Joints

EXPERIENCE has shown that in order to avoid having open joints at the running surface of the rail head, it is frequently necessary slightly to undercut the end of each rail. Otherwise, variations in the accuracy of the cutting of the rails, or in the grade or alignment of the track, may cause the rails to touch at the bottom and be open at the top. If rails are undercut in this manner, however, and the top edges only are in contact, then when wear takes place, the rail ends are no longer in contact.

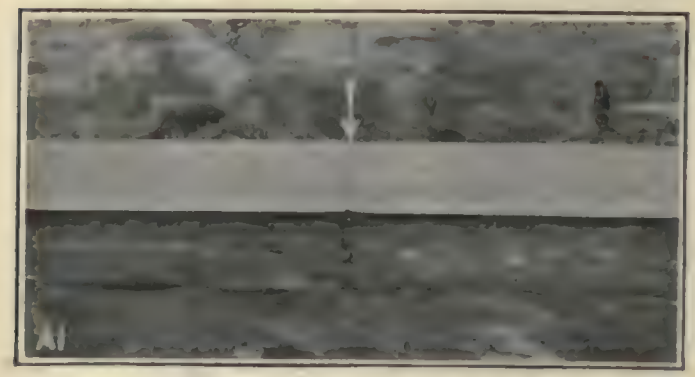


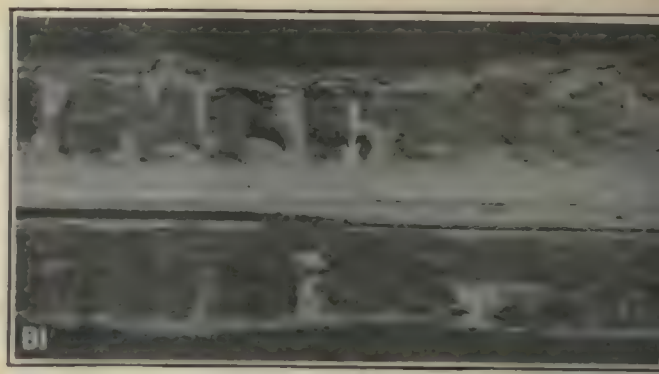

Method Developed by Third Avenue Railway for Finishing Rail Ends

To overcome this difficulty a special method of finishing the rail end has been designed by E. M. T. Ryder, way engineer Third Avenue Railway. According to his plan the end of the rail is undercut, preferably to a greater extent than in standard practice. The head of the rail is then milled or otherwise cut to a plane which is perpendicular to the longitudinal axis of the rail. The ends of the heads of two adjacent rails are brought into contact, and as the area in contact is only 1 in. or 1½ in. in depth, and about one-sixth the depth of the rail, a slight variation, either due to error in cutting or grade or alignment in laying the rail, would be negligible, and the heads of adjacent rails would still be in substantial contact throughout.

In fact, variation in width of the head and lip would be more likely to be material than would variation in depth. Such variation in the width, however, can to a considerable extent be taken care of during the operation of laying the track, as a saw cut can be made between the lips of the adjacent rails if necessary, or between the outsides of the heads, thus leaving a limited area at the end of one rail which is in contact with the corresponding area of the adjacent rail.

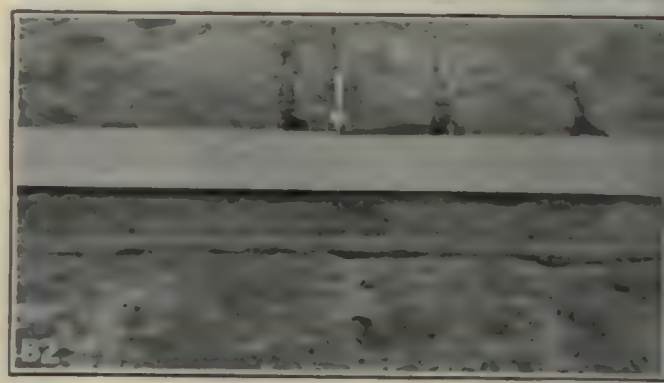
A patent has been granted Mr. Ryder covering this method of finishing rails.

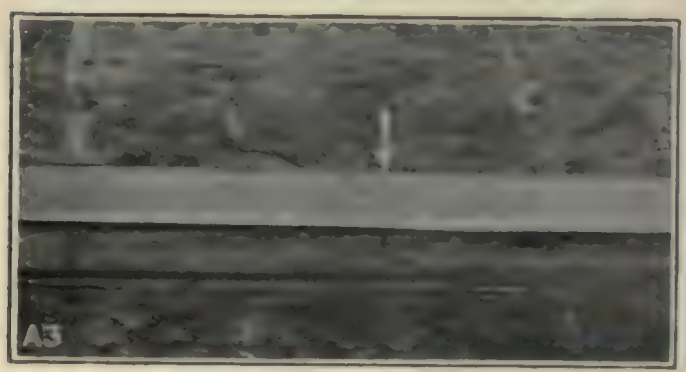


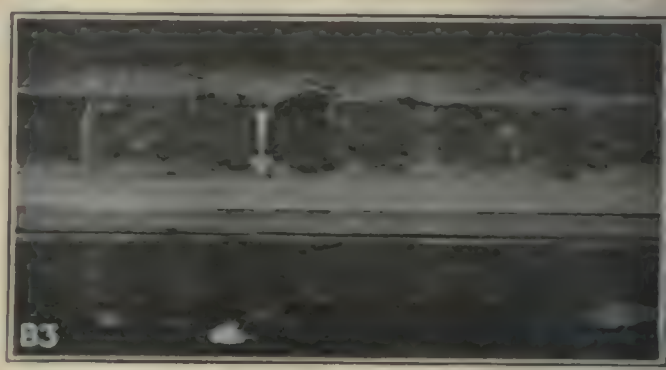



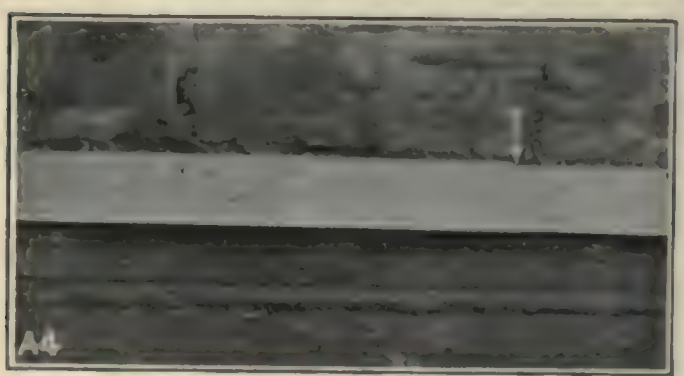


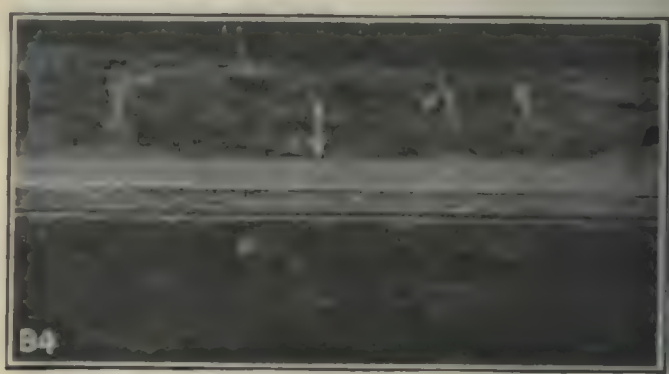




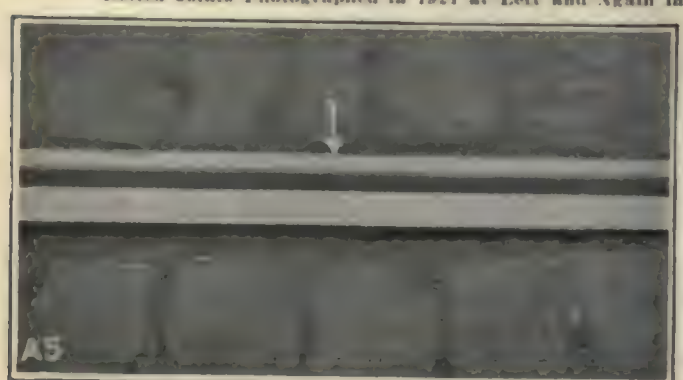



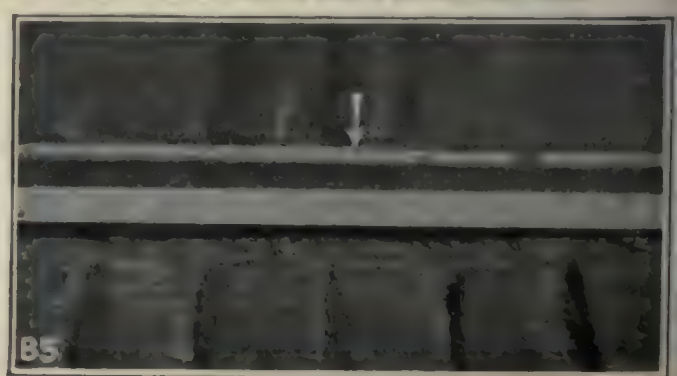




Bolted Joints Photographed in 1921 at Left and Again in 1924 at Right. In the Interval 535,000 28-Ton Cars Passed




Between the Dates of the Pictures at Left and Right 136,000 Cars, Weighing 26 Tons, Passed Over This Joint

# Experience with Bolted Joints in San Francisco

**Among 16,000 Joints of This Type Installed by the Market Street Railway During the Past 13 Years the Only Failures Have Been a Few Broken Rail Ends—Redwood Ties on Rock Ballast Are Used with Concrete Stringers Under the Rails**

SINCE 1911 the Market Street Railway, San Francisco, Cal., has been making extensive use of bolted track joints. Among more than 16,000 such joints that have been installed the only failures during this period have been the breaking of 16 rails through the bolt holes. The track structure is of the ordinary type, in which rock ballast and wood ties are used, but special care is exercised in making the joints. Subsoil conditions vary widely in different parts of the city, ranging all the way from soft mud to rock.

In the lower business district the land has all been made artificially by filling in the shallow parts of the bay. The soil underneath the fill is a peculiar soft mud, and in many places it settles at a rate of about 0.1 ft. per year. Reference to this was made in an article published in ELECTRIC RAILWAY JOURNAL, issue of Dec. 23, 1922. This layer of mud is often as much as 300 ft. in thickness, and no matter what type of track construction is used both it and the entire street settle at a more or less uniform rate.

Outside the area of made land, which extends about ½ mile back from the waterfront, the subsoil is sandy in many places. In other districts, a soft shaly rock is found. Adobe loam and ordinary silty loam are present in certain localities.

Where any kind of rock is present the railway uses only enough ballast to be able to tamp thoroughly. In all other cases 9 in. of crushed stone ballast is placed under the ties. The latter are of redwood, 6 in. x 8 in. x 8 ft., spaced on 2-ft. centers. Rails are Lorain Steel Company section 106-422 and section 121-519. Round 1-in. tie rods are placed 8 ft. apart. The rails are spiked to the ties and in some cases tie plates are used.

A concrete stringer between the ties supports the rail. Concrete is used also as a paving base. On some streets 8-in. stone blocks are laid at right angles to the rail on top of this base. Elsewhere the blocks are omitted, the concrete is brought to a higher level and topped by a 2½-in. coating of asphalt.

The standard joint now being installed has two Lorain bridge type splice bars for 9-in. rail. These are held in place by 12 bolts of 1-in. diameter. All joints are installed by the same crew, consisting of a foreman, who has been in the employ of the railway for many years, and three or four other men. The head bonder has also had long experience at this work, and the remaining men are laborers who have been trained to install joints and do nothing else.

Brazed concealed bonds are first installed. Before fastening the plates, the rails are butted together as closely as possible. Then the plates are put on and bolted, six of the bolts being inserted from one side of the rail and six from the other side. In tightening them sledgehammers are used on the heads and on the plates to drive the latter in to make a perfect fit. In this way, if there is a slight inequality in the fishing sections of the rail, the plate is driven in and made to fit the inequality. The bolts are then tightened again by means of a long-handled wrench.

Cars are permitted to run over the new joints and for several days after the first installation the track gang is kept busy tightening the bolts. This is done five or six times and is repeated immediately before the street is paved, so as to insure that all bolts are snug before concrete is placed around the plates. The head of the rail is then planed with a Vixen planer, so that there shall be no unevenness in the running surface. In a comparatively short time after the rail has been planed and placed in service there is nothing to show the existence of the joint except on the flange side, which has not been affected by wheel passage

With joints constructed in this way, the railway believes that there is little chance of cupping. If cupping should develop, however, the joints are immediately ground smooth. It is thought that cupping at the joints loosens the bolts rather than that loosening of the bolts causes cupping. Experience in San Francisco indicates that so long as proper attention is given to keeping the rail head smooth the bolts do not become loose.

Traffic is extremely heavy on a number of lines where these bolted joints are used, the rush-hour headway being as short as 10 seconds. On other lines, the traffic is not so heavy, but only in a few cases is the headway as long as 5 minutes.

The accompanying illustrations show a number of joints after being subjected to varying amounts of service. No. A-1 to A-4 were taken on Mission Street in the summer of 1921, after the track had been in service about a year. At that time approximately 155,000 cars weighing 28 tons empty had passed over this track. The same joints were photographed again in September, 1924, as shown in No. B-1 to B-4, after 690,000 car passes.

A joint installed in April, 1916, near the intersection of Folsom and Second Streets was photographed on April 7, 1921, as shown in illustration A-5, after the passage of 210,000 cars weighing 26 tons each. When the second photograph B-5 was taken in September, 1924, the joint had had 346,000 car passes.

So far, it has been necessary to grind down the joints on only a few lines, and in these cases the joints had been made from 10 to 14 years ago and had not been planed at the time of their original installation. Since the Market Street Railway has been using the present standard bolted joints, there have been 16 failures due to broken rail ends. In all of these cases it was discovered that there had been a crack in the rail through the bolt holes. Except in these instances, it has not been necessary to open up any of the joints, either to tighten the bolts or to insert a section of new rail.

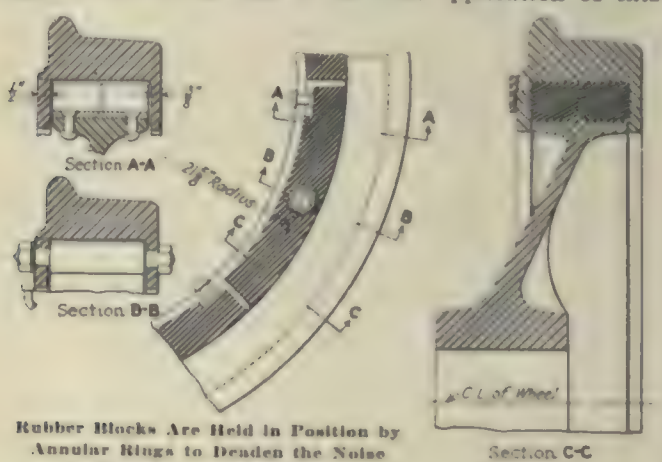
# Cushion Wheels Tested to Reduce Noise

## Rubber Insulated Rims Are Being Tried Out in Oil City, Pa.—The Results So Far Secured Have Been Encouraging

BY JOHN A. DEWHURST
Day & Zimmermann, Inc., Engineers, Philadelphia, Pa.

THE desirability of eliminating noises in street car operation was emphasized in the report of the 1923 American Electric Railway Engineering Association committee on car design. With this end in view, a trial set of cushion wheels has been put in operation on the lines of the Citizens Traction Company at Oil City, Pa., and is now on test on one of the standard safety cars.

This type of wheel has been in use in gasoline rail-car construction for about 3 years, but to the knowledge of the writer this is the first application of this type of wheel to an electric car. The early observations indicate that, while the noise is not reduced to a minimum, the cushion wheels have materially helped to deaden the sound of the rail and wheel contact.




Rubber Blocks Are Held in Position by Annular Rings to Deaden the Noise in This Cushion Car Wheel

One of the most unfavorable points of comparison between the electric car and almost any form of automobile transportation is that of noise. Even a perfect steel wheel rolling against a perfect steel rail will produce a certain amount of noise that cannot be avoided. Add to this condition a little dirt on the track, a few loose joints, or a rail that is partially scored or worn, and the noise is very greatly increased. However, the noise produced between the wheel and the rail is not the only source which exists in street car operation. Loose brake rigging, the action of brakeshoes against the steel wheels and worn gears will add materially to this unpleasant feature and oftentimes produce a very irritating condition. The general public is so used to the noise accompanying street car operation, especially on hard paved streets, that it sometimes does not arouse as much criticism as in many cases is warranted.

The accompanying illustration shows the construction of the cushion wheel, which is designed to reduce the amount of noise occasioned by the ordinary electric car operation over the average track. The wheel has a cast-steel hub which is machined exactly as is the hub of a rolled-steel wheel and is pressed on the axle. The periphery of this cast-steel center, as shown in the diagram, is machined to contain a set of rubber cushions, one set placed on either side of the cen web in blocks about 8 in. long around the entire wh The rolled-steel tire is then pressed on with a li pressure, being held firmly in place by the throu bolts.

When the steel rim is in place, it rests snugly agai the rubber inserts, but the steel flange on either s does not quite come in contact with the cast-s center, there being a space of about ☆ in. The throu bolts are really a part of the rolled-steel rim and not come in contact with the steel center but hold steel rim in place through the agency of the cen web cast on the wheel center.

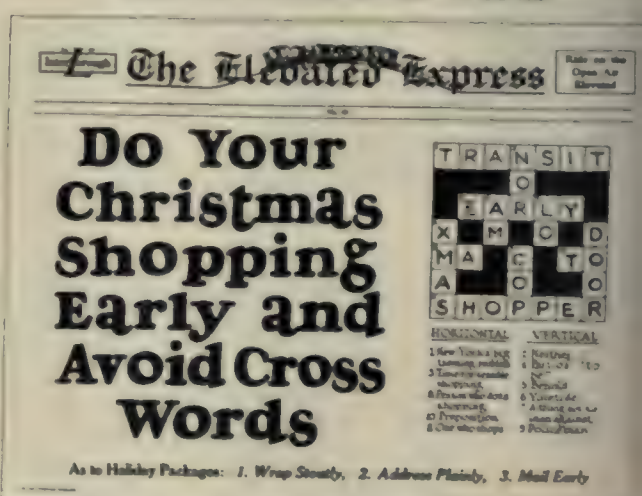
The driving action of the motor is transmit through the cast-steel center and into the rim throu the agency of short angles, which are riveted to steel center and rest against the ends of the rubb blocks, the driving action passing lengthwise throu the rubber blocks to the bolts and hence to the st rim. Under extreme conditions for this type of c the pressure passing through the rubber does exceed 100 lb. for each bolt. The rolled-steel rim so thoroughly insulated from the steel center that it necessary to use a flexible copper bond between two elements of the wheel in order to complete return circuit to the rail.

The rubber inserts are constructed especially this purpose and are of a very high-grade, soft, plia gum rubber, similar in general composition to the ru ber inserts used in the Mead cushion wheels; in fa they are manufactured by this concern.

Besides the noise-reducing qualities of this type wheel, it is expected that the slight give of the st rim with respect to the wheel center will tend reduce very materially the flange wear in special wo occasioned in going around curves of short radius. the wheel flange wear is reduced by this means, it al follows that the rail wear should be reduced on curv and in special work likewise.

Besides this test at Oil City, there is also a s about to be put in operation in Zanesville, Ohio. A additional set for a double-truck car is being co structed for the York Railways at York, Pa.

## How to Avoid Cross Words

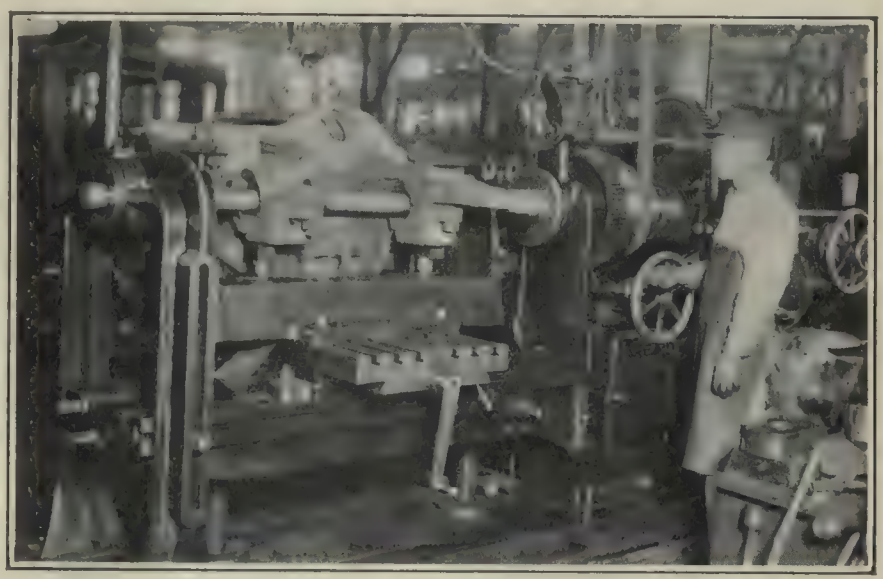



During the period before Christmas the *Elevated Expres* has been displaying an unusual window poster in the ele vated cars in New York City. This has been cleverly devised, as shown above, to encourage early shopping.

# Improving Railway Motor Bearings

**By Reboring Motor Frames to Make an Accurate Fit for New Simplified Housings and Improved Bearings the Public Service Railway of New Jersey Has Reduced Motor Troubles and Cut Bearing Maintenance Costs**

AN ELABORATE program of rehabilitation of the older types of railway motors is being carried out by the Public Service Railway of New Jersey at its Newark shops. This consists of a complete change of the end housings and bearings, both armature and axle, on some motors, and on all others changes to provide for bronze bearings with thinner walls and the use of a new system of lubrication. Up to Nov. 1 of this year approximately 5,000 motors had been revamped, including Westinghouse types 68, 101-B, 101-C, 307 and 514 and General Electric type 80-C. Other types which will be remodeled in the near future include the Westinghouse 93, 310 and 508.

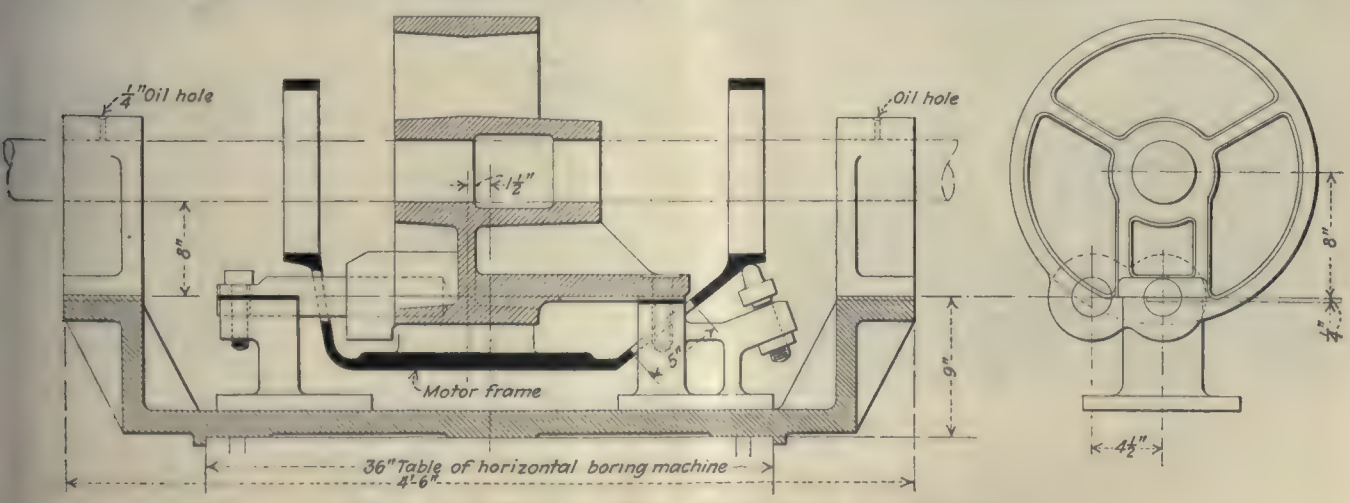


Reboring a Westinghouse Type 101-B-2 Motor Frame in the Newark Shops of the Public Service Railway

The tap bolts used to retain the armature housings on certain types of railway motors have always given much trouble due to their working loose in service. This looseness has caused wear on the outside of the housing, on the inside fits of the motor frame, and in wearing away of the threaded holes in the housings themselves. The result has been the loss of the clamping action of the two halves of the motor frame on the housing. Naturally the wear on other parts has been excessive, and the maintenance costs have been correspondingly high. The parts affected include armature windings, brush-holder parts and carbon brushes, as well as the bearings and housings.

For revamping the motors a through-bolt type of bearing housing has been designed. This is considered a great improvement over the old tap-bolt type, which had to be replaced on the average every 5 years. A new system of lubrication is being installed and other changes are being introduced. An entirely new type of housing is being used in the Westinghouse 101-B and 514 motors. All the other types used by the company are having the necessary changes made to install the new system of lubrication and to provide for bronze bearings with thinner walls than those previously used. The axle bearing caps and fits for the axle bearings in the frame also are being changed to make a more satisfactory design. The new design of housing used by the Public Service Railway is simplified and of lighter weight, requiring less care and expense in casting. Provision has been made for use of lighter weight bronze bearings and Rico vacuum oilers, giving a great reduction in the quantity of waste necessary for packing and maintaining the bearing lubrication.

Among the motors being revamped are both split and box-frame types. Some have armature bearing hous-



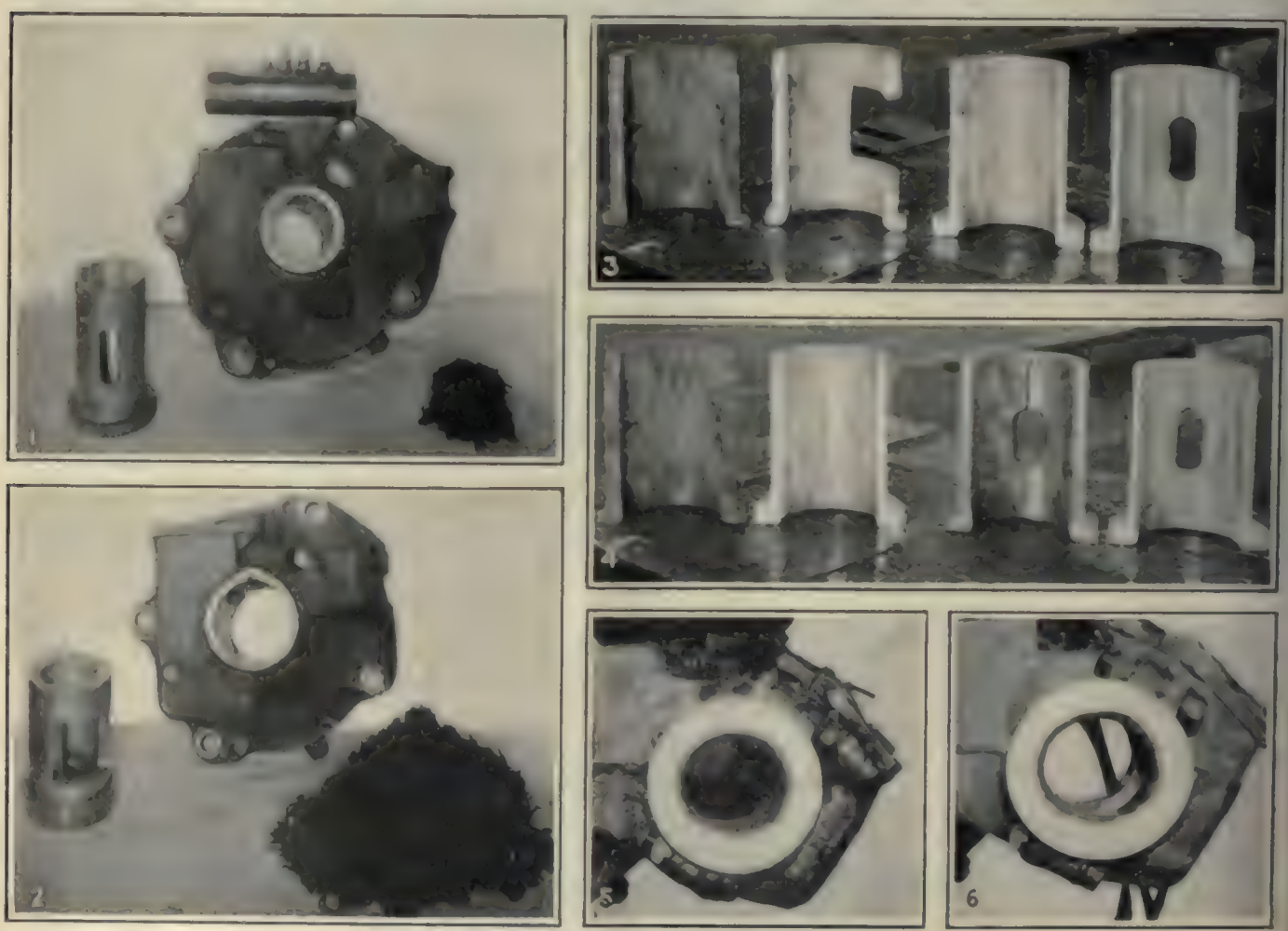

Set-Up and Jig Used for Reboring Westinghouse 101-B-2 Motors



At Left, Frame of Jig Used for Holding Westinghouse Type 93 Motor During Reboring. At Right, Drum for Lining Up Bearing Fits from the Pole Face Seats of Motor Frame

ings and others are without them. The work necessary with the different types varies, and the changes as made will be outlined for a representative motor of each class.

As an example of the work done on a split-frame motor with armature bearing housings, a housing of entirely new design has been provided for the Westinghouse type 101-B motor. In order to take up the wear in the housing fits of the motor frames, these are rebored to a diameter ☆ in. greater than standard, and the outside diameter of the fit on the housing is made larger than the original housing by ☆ in., plus from 0.002 to 0.006 in. The waste chamber and the oil pocket in the original design have been done away with. Instead provision has been made for a Rico vacuum



Changed Housings and Bearings Compared with Old Types

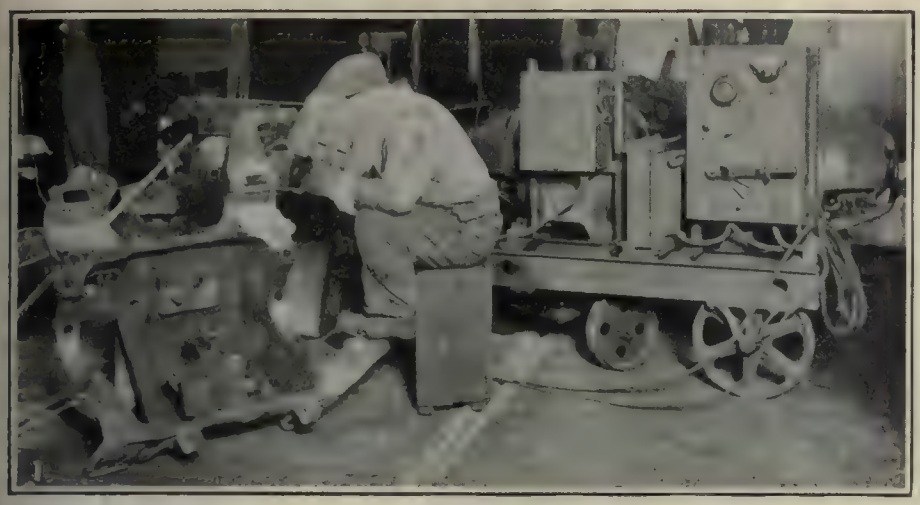
No. 1. New housing and bearing for Westinghouse type 307 motor with pile of waste used for packing.

No. 2. Old housing and bearing for Westinghouse 307 motor with waste packing.

No. 3. Old and new axle bearings used with Westinghouse type 101-B motors.

No. 4. Old and new axle bearings used with Westinghouse type 68 motors.

Nos. 5 and 6. New and old arrangement of axle bearings for Westinghouse type 514 motor. In the new position shown in No. 5 the split for the bearing halves has been rotated from that used with the old construction to bring it horizontal.











**Welding Operations Constitute an Important Part of the Rehabilitation Work**

No. 1. Welding plates in the frame part of the axle bearing fit for a Westinghouse 101-B-2 motor.

No. 2. Plates are welded into the axle cap and frame of 101-B-2 motors to reduce the diameter of the bearing fit. At left, axle cap with plates welded in position. At right, finished axle cap. In front at bottom, plates used for welding in.

No. 3. Pile of Westinghouse 101-C axle caps with waste opening welded shut and adapter welded in place.

No. 4. Plates are welded into the waste opening of the General Electric type 80-C armature housing to form a V leading down to the window of the bearing.

No. 5. New armature housing for Westinghouse 101-B motors.

oiler with a much smaller waste opening located directly on top of the shaft. The size of window in the housing itself has been decreased from 4 11/16 in. x 5 3/8 in. to 1 1/8 in. x 3 1/2 in., with a corresponding decrease in the bearing window. The bore of the housing into which the armature bearing is pressed has been decreased from 4 7/8 in. to 4 1/8 in., giving a corresponding decrease in the thickness of the bearing walls. Provision is made for the through-bolt type of fastening. Other simplifications in construction will be evident from the accompanying illustrations. The amount of waste required with the new housing is a handful as against 1 lb. with the old type.

### Three Diameters of Shafts Provided For

For the 101-B motor, bearings are bored out to three standard sizes, which are the same for both pinion and commutator ends. These bores are 3 1/4 in., 3 5/16 in. and 3 3/8 in. inside the babbitt lining. As the outside diameter of the bearing is 4 1/8 in. plus the allowance for pressed fit, the thickness of wall for the 3 1/4-in. bore is but 3/8 in. The bearings for the old-style housing with the 3 1/4-in. bore had a 3/4-in. wall, so there is a reduction in thickness of the bronze of 50 per cent. The weight of an old 101-B pinion end bearing was 24 lb., while the new bearing weighs but 13 1/2 lb. The lubrication system now used has permitted a decreased size for the windows. For the commutator end, 101-B bearing, the window opening is 1 in. x 3 1/4 in., and for the pinion-end bearing 1 in. x 3 1/2 in. The window is beveled, so that the narrow dimension is 1 1/4 in. at the outside diameter. The old bearings have a window opening at the inside bore of the bearing of 4 in. x 2 1/4 in. for the commutator-end bearing and 4 1/8 in. x 2 1/4 in. for the pinion-end bearing. An increased bearing surface is thus provided in the new bearings which results in increased life.

The armature bearings used with the new housings are of bronze with 1/8-in. babbitt lining. The com-



**Turning Bushing for Westinghouse Type 307 Motors**

A bushing on turning mandrel is shown in the sling attached to the crane ready for insertion in the lathe. In front at the left are six bushings ready for machining. In the center are bushings after being finished. At right, mandrel and other types of bushings used.

positions of the metals for the shells and linings are as follows:

COMPOSITION OF BEARING SHELLS AND LININGS, PER CENT

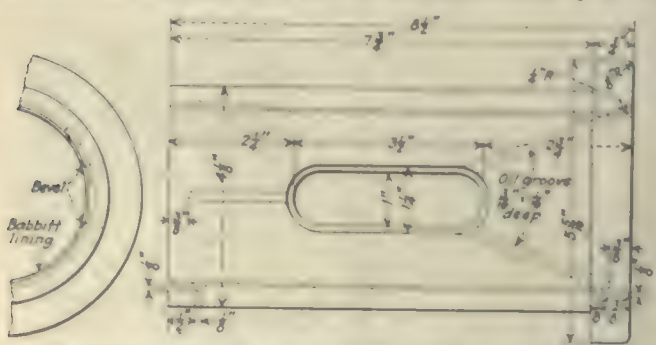
| | Bronze Shells | Babbitt Linings |
|---|---|---|
| Copper | 77 | 2 (Lake) |
| Tin | 8 | 90 (Straits) |
| Lead | 15 | .. |
| Antimony | | 8 |

For the shells a variation of 10 per cent is allowable in the tin or lead, with a maximum impurity of 1 per cent. It is considered essential, to get good results, that only Straits tin and Lake copper be used in the babbitt lining.

An accompanying illustration shows the new design of armature bearings. Two oil grooves run from the window toward the flanged end of the bearing, one going entirely through, so as to lubricate the flange. One groove runs toward the outside end of the bearing. An accompanying illustration also gives the finished bearing tolerances allowed.

The pressure required for pressing bearings into housings runs between 4 and 5 tons. The reduced size for the waste-window opening has done away with buckling and distortion of the bearings while they are being pressed into the housing, giving a tighter and more even fit. No keys are used, but the bearings remain tight. Records show that after 100,000 miles of operation the pressure required to remove this new type of bearing from the head is far greater than with old-type bearings. There is better distribution of the oil with the waste window at the top of the bearing and the danger is eliminated of oil running between the bearing and the head, as in the older type. The waste is held in close contact and cannot fall away, and as it is continuously saturated with clean oil, glazing is eliminated. The necessity of inspecting the waste, teasing it, or repacking the bearing is thus done away with.

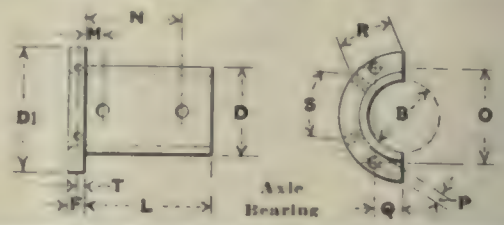
Another advantage found with the top feed bearing is the uniform use of oil. With side-feed bearings, the amount of oil delivered to the waste at the window depends upon the distance that the oil is lifted. In an article by C. Bethel in the ELECTRIC RAILWAY JOURNAL for April 19, 1924, the maximum lift for safe oil supply was given as about 3 in. and the minimum lift for reasonable economy as ¾ in. A variation from ¾ in. to




New Armature Bearing Construction Used for Westinghouse Type 101-B-2 Motors

3 in. in the lift of the oil was also shown to cause a variation of 8 to 1 in the oil feed. With waste-feed lubrication, oil is used again and again, sometimes after its lubricating value has been destroyed through accumulation of foreign material. With the top-feed bearing the oil passes through the bearing but once.

Axle bearings of railway motors are held tight by the clamping action between the axle caps and the frame. In addition, they are kept from turning by dowel pins or keys. The axle bearings for the 101-B motor used by the Public Service Railway were reduced in size from 6 in. outside diameter by 4½ in. bore to 5¾ in. outside diameter by 4½ in. bore. The thickness of the wall was thus reduced from ¾ in. to ⅜ in. No lining is used in axle bearings and the composition is



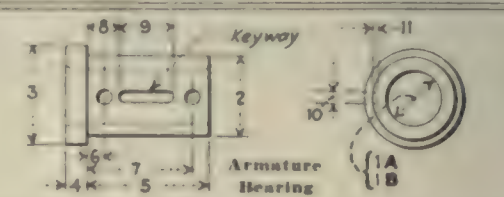

TOLERANCES FOR FINISHED AXLE BEARINGS, MINIMUM FOR WORK, MAXIMUM FOR INSPECTION

| | Maximum, Inch | Minimum, Inch |
|---|---|---|
| B | +0.016 | +0.012 |
| D | +0.016 | +0.003 |
| D1 | −0.031 | −0.031 |
| F | +0.016 | −0.016 |
| L | +0.000 | −0.062 |
| M | +0.016 | −0.016 |
| N | +0.016 | 0.016 |
| O | +0.031 | 0.031 |
| P | +0.016 | 0.016 |
| Q | +0.016 | 0.016 |
| R | +0.031 | −0.031 |
| S | +0.031 | 0.031 |
| T | +0.047 | −0.000 |

TOLERANCES FOR FINISHED ARMATURE BEARINGS, MINIMUM FOR WORK, MAXIMUM FOR INSPECTION

| | Maximum, Inch | Minimum, Inch |
|---|---|---|
| 1A* | +0.013 | +0.009 |
| 1B† | +0.031 | 0.000 |
| 2 | +0.004 | +0.003 |
| 3 | +0.031 | −0.031 |
| 4 | +0.016 | −0.016 |
| 5 | +0.031 | 0.031 |
| 6 | +0.016 | 0.016 |
| 7 | +0.016 | 0.016 |
| 8 | +0.031 | 0.031 |
| 9 | +0.031 | 0.000 |
| 10 | +0.000 | 0.002 |
| 11 | +0.031 | 0.000 |

*Bore in babbitt † Bore in shell




Tolerances for Finished Axle and Armature Bearings

the same as for armature bearings. The improved lubricating system permitted the axle bearings to be split in a horizontal line. The window is in the center of the upper half, while the lower half is solid.

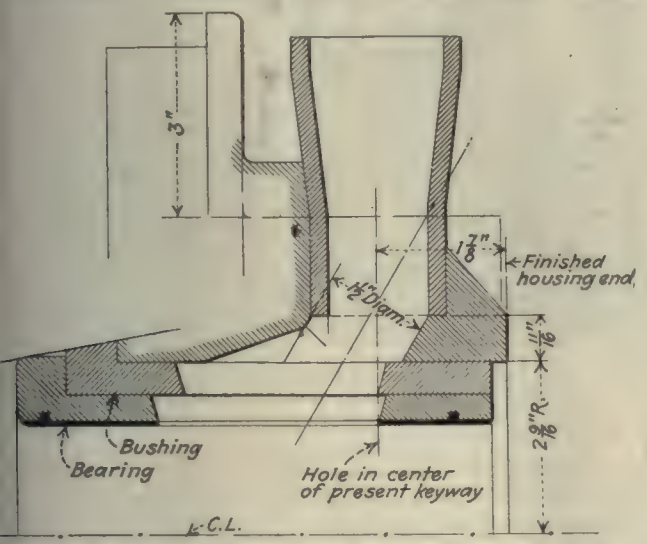
The window opening in the old bearing was 3¾ in. long and occupied an angle of 90 deg. in the half bearing. The new bearings have windows 2¾ in. long by 1¼ in. wide. The original bearings had a ⅜-in. dowel hole in the half containing the window. The new design provides two ½-in. dowels in the solid bottom half of the axle bearing. Two oil grooves are used in the upper half of new bearings. Many of the advantages of the new design of armature bearing also apply to the new axle-bearing construction. Placing the split in such a position that the wear will not come at that point is an advantage. The relocating of the bearing also gives more metal around the dowel holes.

To reduce the size of the opening in the motor frame and axle cap four steel plates are welded in for each bearing opening. Two are in the motor frame and two are in the lower half or axle cap. The space at the edges of the plates and between them is then filled in with the electric arc, after which the opening is ready to be bored out to size. On 101-B motors, the adapter for the new oilers is welded to the motor frame, so as to come on top of the axle bearing. This adapter also provides the opening for the waste and for lubrication to the bearing. The original opening through which the waste was inserted for packing is welded shut, eliminating the covers and any danger of water entering, due to loose or chattering covers.

In addition to the 101-B motors, the Public Service

Railway also has a number of 101-C motors. These have a somewhat different axle-bearing arrangement. In the latter type the adapter is welded into the axle cap and a sheet-iron cover is welded on to close the original waste opening. Accompanying illustrations show the two types and the various methods of welding required.

The work of reboring motor frames, which follows




Method of Applying Bushings to the Housings of Westinghouse Type 307 Motors

the welding, is carried out on a single-spindle horizontal boring mill. The Newark shops of the company have two of these machines, one being a Niles mill and the other made by the Betts Machine Company. The jig used in connection with this reboring is an important part for securing accuracy of the work as well as speed. Two men with one of these machines will rebore eight motor frames in 24 hours.

The jig, which is shown in an accompanying illustration, consists of a heavy iron casting with lugs on the base for supporting the motor frame and uprights at each end, with holes through which the boring bar rotates. The centers for reboring the armature and axle fits are obtained from the pole face seats. The lining up from the pole seats is obtained by means of a large drum mandrel which fits inside the motor and has plates on the outside to fit against the pole faces. It is shown in an accompanying illustration. By varying the thickness of these plates, the same drum may be used for different types of motors.

One of the supporting brackets for the motor frames has an extension which passes up through the bottom hand hole of the motor frame. The top of this extension is used for bolting the central drum in position. Various screw adjustments on the jig provide for rapid adjustment of the motor frame when it is once set. The central drum, together with the end support for the boring bar used to bore out the armature housing fits, provides for accurate location of this from the pole face seats of the motor, and the bearings for the boring bar which bores out the axle bearing fit are accurately located from these. The boring bar has two cutting tools, so that two armature housing fits or two axle bearing fits are machined at the same time. In reboring, a rough cut and a finishing cut are taken. Setting up a motor for reboring takes about one-tenth of the total time required for the entire finishing operation. Both boring mills are served by jib cranes, which are of material assistance in handling the work and heavy parts of the jigs and in adjusting the motor shells for reboring.

### Procedure on Box Frame Motors

The work done on box frame motors is essentially the same as for the split-frame Westinghouse 101-B motor. Several of the illustrations show various details used with the Westinghouse 307 and 514 types, which are both box frame motors. In some cases variations in design make necessary some different methods. The General Electric type 80-C motor has the waste opening for the armature bearing on top. In this case two plates are welded into the opening so as to form an open-ended V with the narrow opening at the window of the bearing. The oiler is bolted directly to the top of the housing without an adapter, and the modified waste opening is used as a receptacle for the waste.

The original armature-bearing housings of the Westinghouse 307-CD-3 and CD-4 motors, which are of box-frame type, are used by pressing in steel bushings to reduce the size of the armature-bearing fits. An accompanying illustration shows the construction used. These steel bushings have a ½-in. wall so that the walls of the armature bearings are reduced by this amount. The old armature bearings were 5⅛ in. outside diameter. The new bearings are 4⅞ in. diameter, with an inside bore of 4⅛ in. The adapters for mounting the oilers are welded into the tops of the housings, and an opening is made in the steel bushing in line with the bearing window. In this case the work consists of boring out the housing and cutting a recess for the opening at the top, after which the adapter is welded in place and the steel bushing is pressed in. The work of machining the steel bushing is done on a small lathe, and the bushings are held by a special mandrel for turning.

## Cars Operated Over New Concrete Roadbed in 26 Hours

THE use of Lumnite quick-hardening cement allowed the Albany Southern Railroad to operate heavy interurban cars over a new concrete roadbed in Hudson, N. Y., in a remarkably short time after its construction. The concrete was poured during the morning of Oct. 26,



This 32-Ton Interurban Car Was Operated Over a New Concrete Roadbed 26 Hours After Its Construction

1924. On the following morning, only 26 hours after pouring, a 32-ton interurban car was operated over this track. No damage whatsoever resulted to the pavement. Lumnite cement was used in this case because the route is one over which the interurban cars are scheduled on a comparatively short headway and it was desired to

reduce to a minimum the time the track was out of service.

Lumnite cement is made by the Atlas Lumnite Cement Company and is essentially aluminous. Its chemical composition is approximately silica, magnesia, etc., 5 per cent; alumina, 40 per cent; lime, 40 per cent, and iron oxides, 15 per cent. It is used in the same general way as portland cement, except that on account of its more rapid hydration slightly wetter mixtures are used. For several hours after setting the surface must be kept damp to prevent incomplete hydration.

While this cement develops at 24 hours a greater strength than ordinary cement develops in 28 days, it is not quick setting. It allows the usual time for mixing, transporting and pouring into forms, but after setting its early strength develops with great rapidity. These qualities are of special advantage in such cases as that occurring at Hudson, and a number of street railway companies are experimenting with this cement.

## Steel Reinforcing Bar Sizes Simplified

THE Division of Simplified Practice of the Department of Commerce, through the unanimous action of a joint conference of representatives of manufacturers, distributors and users of square and round steel reinforcing bars, has promulgated a simplified list of recognized sizes for the purpose of eliminating a large number not in common use, as follows:

| Area in Square Inches | Size in Inches | Style |
|---|---|---|
| 0.049 | ¼ | Round |
| 0.110 | ⅜ | Round |
| 0.196 | ½ | Round |
| 0.250 | ½ | Square |
| 0.307 | ⅝ | Round |
| 0.442 | ¾ | Round |
| 0.601 | ⅞ | Round |
| 0.785 | 1 | Round |
| 1.000 | 1 | Square |
| 1.266 | 1¼ | Square |
| 1.563 | 1¼ | Square |

This reduced list of sizes becomes effective as applying to new production Jan. 1, 1925, and will remain in effect for a trial period of one year, at the end of which time all interested organizations will be given an opportunity to suggest modifications or additions.

## How Treadle Works on Toronto One-Man Cars

SINCE the publication in ELECTRIC RAILWAY JOURNAL for Nov. 8, 1924, page 799, of an article describing the automatic rear exit doors on Toronto rebuilt cars,



The Treadle Which Operates the Rear Exit Door Is 9¼ In. Below the Level of the Rear Platform



At Left, Rear End of Rebuilt Toronto Car Equipped with Automatic Exit. At Right, by Means of This Mirror the Motorman Can See the Condition of the Rear Exit

additional information and photographs have come to hand. In the accompanying illustrations are shown the step from the rear platform down to the treadle, and the sign directing passengers who wish to get off the car.

Another picture shows a passenger standing on the treadle with the door in the open position, and the lower step down. A third picture shows the mirror fastened to the front door of the car in such a way that the motorman can see clearly the condition at the rear end of the car.

# The Readers' Forum

### *Both Babbitt and Tin Used for Thin Lining of Bearings*

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY

EAST PITTSBURGH, PA., Nov. 20, 1924.

To the Editors:

In the Oct. 25, 1924, issue of ELECTRIC RAILWAY JOURNAL, page 725, under the title of "Armature Bearing Practice for Railway Motors," there is a statement to which I wish to call attention. Quoting from the JOURNAL:

"There is, however, a decided tendency away from the babbitt lining for armature bearings. Motor manufacturers are now furnishing a bronze type of bearing with thin tin linings almost entirely with their new motors."

Regarding the above, it appears that this refers to axle bearings instead of armature bearings, as it is the practice of the Westinghouse Electric & Manufacturing Company, and I believe also of the General Electric Company, to use solid bronze axle bearings tinned. However, for armature bearings, bronze bearing shells with from a $\frac{1}{16}$ in. to $\frac{1}{8}$ in. lining of babbitt metal is considered good practice. JOHN S. DEAN,

Renewal Parts Engineer.

# Equipment Maintenance Notes

## riction Brake Puts Tension on Banding Wire

A WINDING brake consisting of a grooved steel friction drum and brake drum mounted on one shaft used by the Gary Street Railway, ary, Ind., to maintain a uniform nsion on banding wire being wound an armature. The banding wire sses around the grooved drum be- re it is fed to the revolving arma- re, while a lined metal band rapped around the brake drums re- rds the rotation and applies tension the wire.

The shaft is mounted on a -shaped support, fastened to a steel r, one end of which is bolted to the rriage of the lathe. Near the other d of the bar is a second support lding the wire reel. A light brak- g effect is used to keep the reel om spinning. Between the reel d the drums is a guide. This ar- ngement is shown below.

The friction drum has a diameter 9 in. and is 1 in. wide, with five mi-circular grooves, of the same ze as the banding wire, cut in the ce. From the reel the wire passes rough the guide and thence to the tside groove of the friction drum. is carried around the drum four times, a small pulley being used to change the wire from one groove to the next. The brake drum is 1 in. wide but has a diameter of only 6 in. A brake band around this drum is fitted with ordinary automobile brake-lining material. One end of the band is attached to the supporting frame while the other is fastened to a threaded rod which passes through the horizontal supporting bar. The brake pressure is adjusted by means of a winged nut which rests against a compression spring at the threaded end of the brake band below the horizontal bar. This apparatus has been found very satisfactory to maintain a uniform tension in the banding wire.



Friction Drum Apparatus Used to Keep an Even Tension on Banding Wire

## Bearings Rebored to Fit New Style Motors

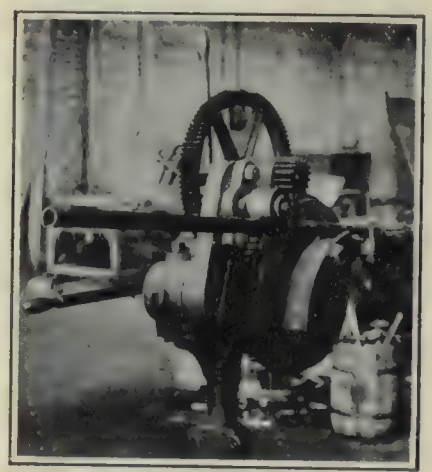
AT THE time when the Eastern Massachusetts Street Railway decided to replace all of its type 67 motors by those of a newer model it had on hand a large number of armature bearings of the old design. In order to adapt these for use in modern motors it was decided to rebore them. The bearings originally designed for use on the commutator end of the No. 67 motor was rebored for use on the pinion end of No. 247 motors. The pinion end bearing of the old No. 67 motor was rebored for use on the pinion end of type 200-E motors. By this process the railway was able to obtain a year's supply of new bearings of types now needed.

## Pipe Bending Machine Built in Kansas City Shop

BY JOHN W. HOGAN
Foreman Kansas City Railways

THE machine shown in the accompanying illustration was built in the shop of the Kansas City Railways for bending the larger sizes of pipe and conduit.

As shown in the illustration, the forming die is mounted on a face plate, hand driven through reducing gears by four long levers. The end of the pipe is slipped into a U clamp mounted at one end of the die. A small roller fastened to the frame of the machine holds the pipe in position as the face plate is rotated.



This Hand-Driven Pipe Bending Machine Built in the Shops of the Kansas City Railways Has Proved to Be a Valuable Time Saver on Large Reconstruction Jobs

Forms of various sizes can be used in connection with the machine, and they are inexpensive to make up. For conduit work it is, of course, undesirable to make bends of very short radius, due to the difficulty of pulling the cables into place. As used in the Kansas City shop, several different forms for the various sizes of conduits have been found particularly useful. This includes forms for mak-

ing bends of 7-in. and 10-in. radius in 1-in. and 1¼-in. pipe, 7-in. and 14-in. bends in 1½-in. pipe, and 16-in. bends in 2-in. pipe.

On the larger overhaul and rebuilding jobs such as are undertaken in most electric railway shops this machine has proved to be a particularly valuable time saver.

## Steel Roller Chains for Snow Sweepers

WHEN the snow sweepers of the Altoona & Logan Valley Electric Railway were overhauled last summer in preparation for the coming winter, steel roller chains to drive the brooms were installed in place of the old malleable-iron link chains. This was accomplished at small cost under the direction of C. E. Keefer, master mechanic. In the past, some trouble was experienced on account of breakage of the malleable-iron



More Reliable Sweeper Operation Is Secured by Using Steel Roller Chains

chains while the sweepers were at work. It is expected that the new chain will eliminate this trouble, and will last as long as the sweepers themselves. Another interesting point in connection with the overhauling of the sweepers is the fact that they were painted a bright red to increase the visibility.

## Convenient Mounting for Pinion Puller

AN ARMATURE mounting used in connection with a pinion puller in the 39th Street shops of the New York Rapid Transit Corporation, Broklyn, N. Y., is shown in the accompanying illustration. The ar-

# *Dick Prescott Starts His Journey*

### And Rehearses Some Questions



AT LAST Dick Prescott, the newly appointed engineer of equipment of the Consolidated Railway & Light Company, and Steve White, the carpenter shop foreman, found themselves in the club car of the Limited bound for Centerville, the first stop on their trip of inspection. They had made out an itinerary and also had made up a list of things to go over on each property visited. Both Dick and Steve had carefully reviewed the files of ELECTRIC RAILWAY JOURNAL before starting. In that way they were able not only to select properties showing the most evidence of progressiveness, but also had found that the complete information available made it possible for them to concentrate on getting a first-class impression of how the new methods work out in practice.

"Well, Steve," said Dick, as they settled back on the cushions, "tomorrow we ought to have an interesting time out at the Centerville Railway shop." Taking a memorandum book from his pocket, he continued:

"I've made up a list here to use as a guide in asking questions about the work of the engineering departments. Here's some of them.

"How many men in engineering department?

"Is the policy to standardize parts and fittings used on cars?

"Do they have a drafting room?

"Are drawings made of standard patterns—and are they kept up to date?

"Do they make sketches for special jobs?

"Are limits of wear established for parts frequently renewed?

"Does the engineering department follow up the performance of parts put on cars for test?

"Are wiring diagrams and data put in convenient form for shop and carhouse foremen?

"Does the engineering department prepare specifications for new material?

"Does it co-operate with the storeroom and make drawings for ordering special parts?

"Does an inspector reporting to engineer of equipment determine if drawings are followed and if maintenance methods are up to the standard?

"Does it prepare estimate on cost of new work and issue storeroom requisition for materials on special jobs so that they can be ordered early enough to be on hand when wanted?

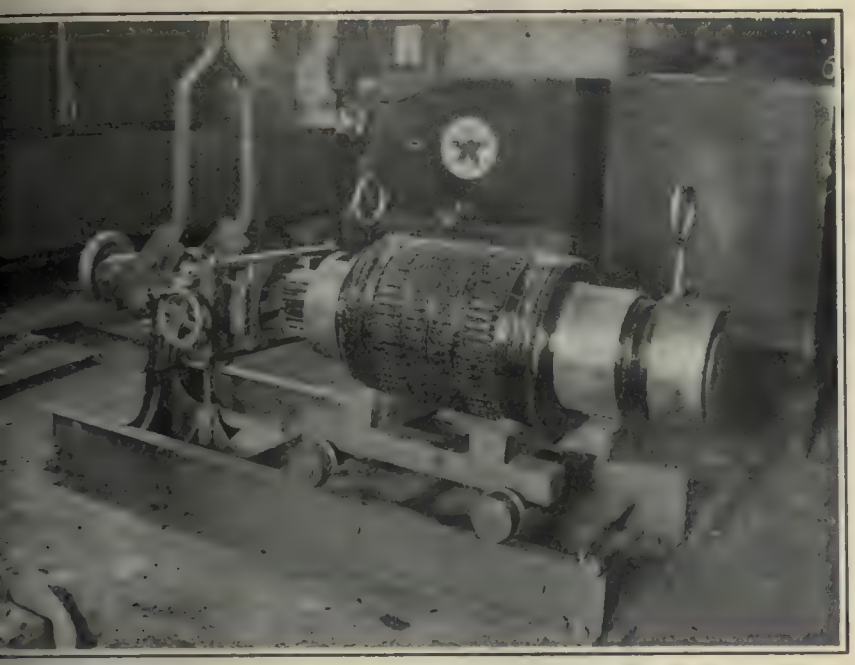
"Does it ....."

Then Steve interrupted. "Gosh, Dick, that list must be a mile long. You're way ahead of me. I can see you've put lots of thought in there and I want to go over your questions when we can discuss them more fully. You've got work enough laid out there to keep an engineering department busy for a long time."

"Of course I have, but I haven't even scratched the surface. Remember this, Steve. So far as I can see every one of those functions is being performed by somebody in every railway shop. If an engineering department doesn't do them, then somebody else who ought to be putting all his time on productive work is doing them. If they are not being done right, the whole shop is working at reduced efficiency, work is spoiled, and maintenance costs are higher than they should be and pull-ins are too numerous."

"That's the spirit, Dick. You're going at it the right way. But I think you're working on something almost entirely new in this old electric railway game and it'll be a hard grind to make our shop really understand what you're driving at. We can't settle it tonight, anyway, so let's turn in so as to be all fresh in the morning when we visit the Centerville people."

"I guess that's a good idea," said Dick as they moved out the door. "I'll shoot these questions at them tomorrow and find out what they've got to say."



A Carriage with Adjustable Wedges that Centers the Armature with the Pinion Puller

ature is placed on a carriage, so at it can be pushed into position adily and is always centered with e pulling apparatus. The carriage, nich consists of a wooden frame-ork with four small cast-iron wheels, oves back and forth on a short ack made of two pieces of 6-in. annel. The armature support on e carriage has wedges with four fferent bevels, adjusting the height support four different armature ameters. The faces of the wedges e marked so that they can be read-placed in position for the particu-r type of armature from which the nion is to be removed, so that it ill come central with the shaft of e pinion puller when shoved into sition.

To remove a pinion the carriage is ushed forward so as to come in con-ct with the central shaft of the nion puller which rests against the d of the armature shaft. Two ws which go in between the end of e pinion and the head of the arma-re slide in guides and are moved by screw with a handwheel on the side the guide. Another screw on the d of the pinion puller forces the ntral shaft firmly against the mature shaft. The pinion then can removed by pulling the vertical ndle which actuates an eccentric m to give the necessary force for moving it. The pinion puller was de by the Metropolitan Engineer-Company, Brooklyn, N. Y., but mounting and adjustable feat-es were made in the shops of the ilway.

## Old Car Made Into Traveling Paint Shop

SINCE the building of the new Everett shops of the Boston Elevated Railway, car painting has been done there whenever possible. The cars operated in the Cambridge subway, however, are too wide to be operated over the tracks reaching the new shops. For that reason a traveling paint shop has been arranged by building a new body on the frame of an old single-truck car. This vehicle carries a complete outfit of painters' supplies and also provides a place where the men can change their clothes. The car is not motorized, but is pulled from place to place by a service car. Since its completion the traveling paint shop has proved to be a convenience for the purpose intended, as well as for other odd painting jobs.



This Car Carries a Complete Outfit of Painters' Supplies and Provides a Place Where the Men Can Change Their Clothes

## Reclaiming Worn Compressor Cylinders

WHEN air compressor cylinders become badly worn or scored the efficiency falls off very rapidly. Several different methods are used for reclaiming the cylinders, the most common being to follow the automotive practice of grinding the cylinder to an oversized dimension and using oversized pistons.

The Twin City Rapid Transit Company's mechanical department does not use this method because of the necessity of carrying special pistons in stock, and also because the capacity of the compressor is changed by the oversized bore. Instead, the practice on this property is to bore out the worn cylinder to a predetermined dimension and then to insert cast-iron sleeves which are pressed into the cylinder. These sleeves are then bored and ground to a final finish which retains the original standard size for the bore.

When the cylinders are bored out, they are made large enough to leave the finished sleeve with approximately a $\frac{1}{8}$-in. wall. Before they are pressed in and rebored, these sleeves have an interior bore small enough to give a wall thickness of sufficient strength to withstand the strain of pressing into place in the cylinder. This thickness is approximately $\frac{1}{2}$ in.

The cylinders themselves are bored 0.002 to 0.003 in. under the outside diameter of the sleeves, to allow for a press fit.

When the cylinder is bored out, a shoulder is left near the bottom of the cylinder wall, and this forms a stop for the sleeve when the latter is being pressed in. If the cylinders become worn or scored a second time, it is a simple operation to bore out again and install new sleeves.

# New Equipment Available

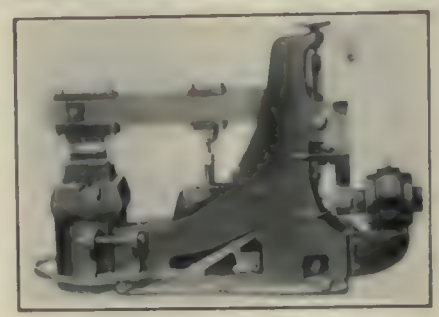
## Air-Cushioned Helve Hammer

AN air-cushioned helve hammer with many new features in design is being introduced to the market by Baudry Company, Inc., Everett, Mass. The hammer has a semi-inclosed frame, upon the rear of which is an adjustable yoke supporting the helve at its pivoted end. The air compressor within the frame is cast in one piece with a cylinder actuating the helve, the piston of which connects with the helve. A rotary valve operated by the treadle is located between the two cylinders for controlling the blow.

The machine is designed for either belt or motor drive. When belt driven, tight and loose pulleys and belt shifters are included as a part of the unit. For motor drive, the tight pulley is replaced by a gear engaging the pinion of the motor, making the machine entirely self-contained.

The hammer has no rubber bumpers, being cushioned entirely by air. The machine will also deliver its lightest tap or its heaviest blow at full speed. This results in increased production. Regulation by the pedal does not change the speed of the hammer but only the strength of the blow. When at rest the hammer is at the top of its stroke with the helve elevated and dies apart ready to receive the work. The hammer compresses its own air so that no outside supply is necessary. The two cylinders are cast integral with the semi-inclosed frame. One compresses air and the other distributes it for the use of actuating the hammer helve. The air supply to the cylinder is regulated by a rotary valve operated by a treadle. The hammer helve is adjustable for varying thicknesses of stock. The anvil is entirely separate from the main frame casting.

The pivot of the helve has hardened steel centers easily adjustable and affording a means for entirely eliminating side play of the dies so that they will always register with each other. When adjusting the dies for different thicknesses of work, four nuts are loosened on the pivot yoke and the hand wheel on top of the machine is turned the proper amount to raise or lower the yoke, after which the four nuts are tightened. The connecting rod of the helve is adjusted by a turnbuckle. This makes the adjusting a one-man job. The machines are built in four sizes with from 40 to 200 lb. rams. The floor space occupied is small, being 26 in. x 60 in. for the 40-lb. size and 36 in. x 75 in. for the 200-lb. size.



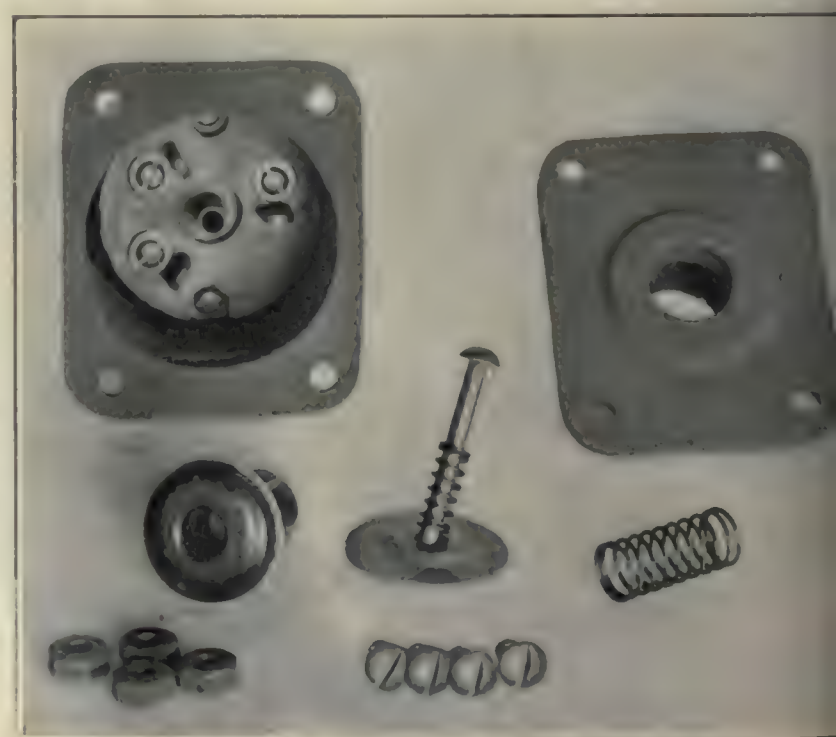
Helve Hammer with Air Cushioning

## Push-Button Switches fo Door Control

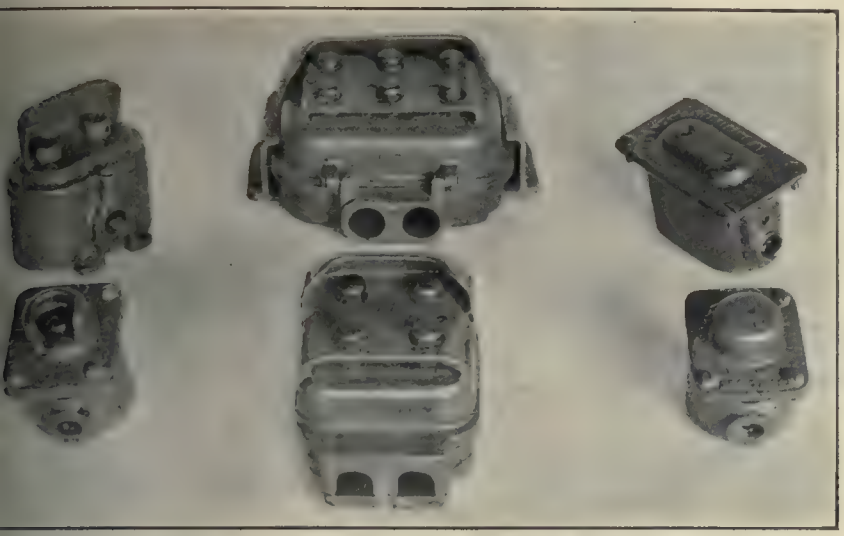
SEVERAL improvements have made in the construction of 307-type of push-button swit furnished by the Consolidated Heating Company, Albany, N. for electric control of door eng An accompanying illustration sh some of these switches, which made in single, double, four or button units. All have cast- cases.

The contact disk is made two types. For low-voltage (battery circuits) a metallized bon disk is employed, and a m metal disk is used for 600-volt cuits. When the metallized ca disk is used, a reinforcing pla added to prevent breaking.

In the illustration which show details of a single-unit 600 switch, it will be noticed that monel metal disk has a boss at center. This provides for a roc action of the disk, so that it make firm contact without bein fluenced by the pressure of the button or stem. Two helical spr are used with this construction, between the insulated base and disk to open contact as soon as sure is released, the other bet the push button and the disk to mit a further movement of the button after the disk is firml contact. The springs are of phor bronze to eliminate corros



Details of Single Unit Push-Button Switch for Door Control

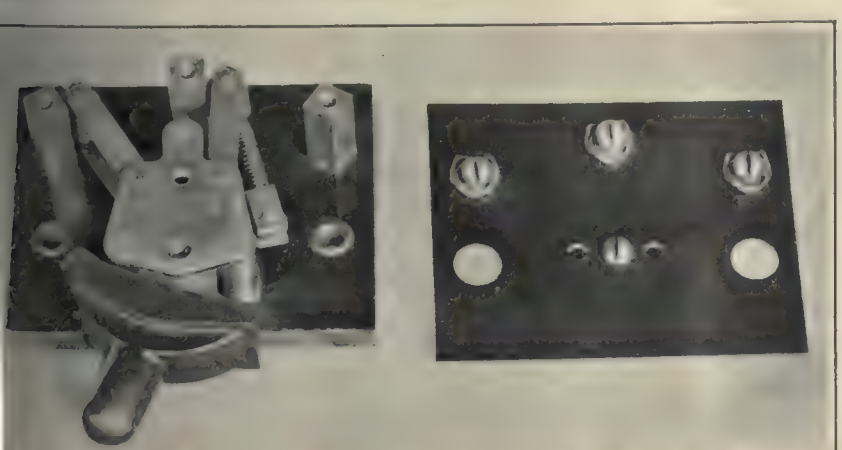


Six Types of Push-Button Switches Used for Electric Control of Car Doors

The cases are arranged for con- it connection and are ventilated to event an accumulation of moisture. e stationary contacts are mounted a molded base. The plunger has a g guide to eliminate binding and provided with a button head to fit o a recess in the push button. is button head allows the button rock, so that a side thrust will not erfere with the working of the nger. A rawhide washer between back flange of the button and the e takes up any shock in case the tton is released suddenly, and minates breakage. The standard nstruction for the stationary con- ts is with three posts. This in- es better contact. The cases are ovided with shields to protect the ttons where there is likelihood of ssengers leaning against them. In illustration showing six types of itches, the two at the right with- push buttons are arranged for side operation of doors. A small ening in the cover provides for the ertion of a nail or small wire to erate the button. Improvements have also been made in the electric switch which is furnished for door control, where push buttons are not desired. The operating mechanism of this switch is of toggle form so that the switch is thrown with a snap as soon as the operating handle passes the center. The switch has a bakelite handle and the bearings of the toggle mechanism are of hardened steel. An accompanying illustration shows the construction.

## Twist Drill Grinder

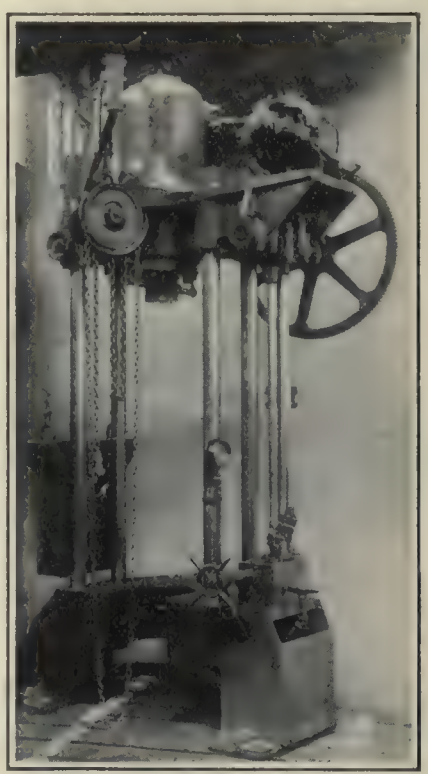
AN ELECTRICALLY driven 6-in. bench or pedestal grinder which will quickly and accurately grind straight or taper-shank twist drills up to $\frac{5}{8}$ in. in diameter has been placed on the market by the Black & Decker Manufacturing Company, Towson, Md. The twist drill is fed to the cup-grinding wheel by means of a micrometer screw feed. No adjustments are necessary for grinding different sizes of twist drills, this being compensated for in the new design.



Toggle Switch Used for Electric Control of Door Engines

## Rapid Action Hydraulic Press

A SELF-CONTAINED rapid action hydraulic bushing press has recently been placed on the market by the Southwark Foundry & Machine Company, Philadelphia, Pa. The press is entirely self-contained and is complete with a hydraulic pump and electric motor so that no auxiliary water or air connections are necessary. The rapid movement of the ram is obtained by a triplex pump with one low and two high pressure plungers. The high-pressure plungers are of small diameter. The third plunger is of larger diameter and pumps a large volume of water, bringing the ram rapidly down to the work. As soon as contact is made



This Hydraulic Press Has a High and Low-Pressure Triplex Pump to Do Fast Work

the pressure builds up in the cylinder and the low pressure plunger then automatically cuts out and the working pressure is supplied by the high-pressure plungers. A counterbalance returns the ram to the starting position.

The bottom platen or work table has the slack water tank as an integral part of it. This platen can be furnished in several designs to suit work. The press can be furnished in capacities of from 30 to 200 tons. An overhead jib crane is supplied to take a chain block hoist so as to handle work on both sides of the press.

# Association News & Discussions

## Hoover Conference on Road Safety

### Representatives of All Concerned in Street Traffic Safety Gather and Give Solution of the Accident Problem a Big Impetus by Drawing Set of Principles for Guidance of All in Developing Proper, Adequate and Uniform Laws and Regulations

UNDER the auspices of the federal government, a most remarkable nationwide conference directed toward reduction of the serious number of accidents on our streets and highways was held in Washington, Dec. 15 and 16. The National Conference on Street and Highway Safety was called by Herbert Hoover, Secretary of Commerce, who personally acted as chairman during a large part of the deliberations. The attendance of some 500 came from practically every state in the Union and included representatives of every industry and activity having any concern with the use of the streets and highways. There were police officials, public service commissioners, highway and motor vehicle commissioners and representatives of insurance companies, railroad and street railway companies, safety councils, chambers of commerce, labor unions, women's clubs, automobile associations, automobile manufacturers, and various other national groups. National associations which co-operated with the Department of Commerce in organizing and financing the conference were the American Electric Railway Association, American Railway Association, American Automobile Association, American Mutual Alliance, National Automobile Chamber of Commerce, National Safety Council, National Bureau of Casualty and Surety Underwriters, the National Taxicab Association and the Chamber of Commerce of the United States.

The morning session on Monday was given over to a presentation by summary of the eight committee reports which had been prepared at the direction of Secretary Hoover during the past six months. These covered statistics, traffic control, construction and engineering, city planning and zoning, insurance, education, the motor vehicle and public relations. The personnel of each of these committees was made up of men selected by the secretary in co-operation with the various associations and organizations in order to get the most competent as well as most representative groups together on each committee. E. J. Murphy, chief statistician American Electric Railway Association, was a member of the committee on statistics. J. P. Barnes, president Louisville Railway, was a member of the committee on traffic control and the committee on public relations. C. E. Morgan, vice-president Brooklyn City Railroad, was a member of the committee on construction and engineering. L. S. Storrs, president the Connecticut Company; Daniel L. Turner, consulting engineer New York State Transit Commission, and Charles B. Scott, Bureau of Safety, Chicago, were among the members of the committee on city planning and zoning. Mr. Scott was also a member of the committee on insurance. Edward Dana, general manager Boston Elevated Railway, and W. D. B. Ainey, chairman Public Service Commission of Pennsylvania, were members of the committee on education. L. H. Palmer, vice-president and general manager United Railways & Electric Company of Baltimore, was a member of the committee on the motor vehicle. Thus the electric railway industry was represented on each of the committees.

At the afternoon session on the first day the eight committee reports were opened to discussion. At five o'clock Chairman Hoover announced that the time had come for the various groups to assemble, according to an announced plan, and each to select a delegate to represent it on the "steering committee" which would meet that evening to draw up a report that would form a consolidation of the eight individual committee reports and place a definite program of recommendation before the conference on the following morning for its action. The electric railway group selected L. H. Palmer as its representative and Mr. Barnes also served on the steering committee by virtue of being official delegate of the American Electric Railway Association.

On Tuesday the conference went over the consolidated report, point by point, and passed upon it. The debate on many points was lively and earnest. Each point in the final report represents the harmonizing of views, first in the committees, then in the steering committee, and finally by the conference as a whole, so that it is an expression which probably comes as nearly as can be obtained to meeting the approval of all interests. A review of the final report as adopted by the conference follows:

#### RECOMMENDATIONS REQUIRING LEGISLATION

Under the general heading of Legislative Principles, the report indicates the desirability of avoiding too much detail in legislation, and also advises a minimum of restrictive laws and regulations. As to the part of the federal government in this program, the report states that it is one of encouragement, of assembly and distribution of information, and the development and use of best practices, but expresses the bel that uniformity of traffic laws will secured by voluntary action of the v rious states.

Each state should enact constructi legislation, including enabling ac which will empower cities and oth local units to provide for a proper d velopment of the traffic situation their territories. A state departme or bureau should be created to admi ister the laws applying to motor ve cles, including the issue and revocati of licenses for both cars and drive and the enforcement of regulation the highway. The motor vehicle d partment should have a staff adequa and qualified not only to handle licens but to examine drivers, regulate traf on the highways, investigate acciden and enforce regulations regarding d sign, construction, inspection and mai tenance of motor vehicles. Regulato legislation should be for adoption states and not by cities.

Under municipal government the should be an adequately manned traf division in the police department, wi traffic safety a major function. In states and municipalities there shou be specific provision for adequate a timely planning of traffic facilities a traffic control measures. These shou be closely co-ordinated nationally, b tween adjoining states, and betwee states and their political subdivision Large metropolitan areas should estab lish special traffic planning commissio to study the flow of traffic and eliminate hindrances to this flow an correct unsafe traffic conditions.

#### FULL STOP URGED AT DANGEROUS RAILROAD CROSSINGS

To eliminate grade crossing acci dents, the conference recommended tha legislation be passed requiring a motor vehicles to come to a full sto before crossing such railroads as ar designed and marked accordingly by th state railroad or public utility com mission. In other words, the sto law as a principle is indorsed, but it application in each case is left to th judgment of the state commissio rather than to suggest a blanket la applying to all grade crossings. Elimi nation of grade crossings, either by re location of highways or rail lines or b grade separation, the report states, con stitutes the only perfect solution of th grade crossing problem. But thi should be carried on under proper pro grams, so as not to impose an excessive financial burden, resting in the las analysis upon the public. Relocatio of highways offers many possibilities not yet fully developed, which should be worked out by the state authorities in co-operation with the railways. Au thority to order grade separation or proper protection at grade crossings should be vested in the state commis-

## Coolidge Stresses Urgency of Conference Task

PRESIDENT COOLIDGE asked the privilege of addressing the Hoover Conference and at 2 p.m. on Tuesday made the following statement to some 500 delegates assembled before the South Portico of the White House:

**The national conference on street and highway safety has been called by the Secretary of Commerce for the devising of means and the making of recommendations toward the lessening of the numberless accidents which now kill and maim so many of our citizens. Few conferences are more opportune or deal with graver affairs. With the deplorable and continuing increase in highway mortality and injury the time is highly appropriate for a comprehensive study of the causes, that we may have proper understanding of conditions and so may intelligently provide remedies.**

**The problem is but one of those inherent in advancing civilization. The increasing demands upon our highways from a growing population, the development of new uses, the imposition of modes of transportation not contemplated when they were created, have brought about congestion, confusion and conflict, until the yearly toll of traffic accidents has reached an appalling total. If the death and disaster that now fall upon innocent people, through the year and over our country as a whole, were concentrated into one calamity we would shudder at the tremendous catastrophe. The loss is no less disastrous because diffused in time and space. The evil you are combating is so widespread as to be of national concern, and we do well to look at it with a country-wide vision. But its solution does not rest in national action. Highway control is primarily for the states, and it is best that this is so.**

**We cannot regulate local traffic by act of Congress. Means to overcome the difficulties, to keep our complex traffic moving with order and safety, must be found by the states. It is a proper function of federal authority to mobilize the best experience in each part of the country that it may be applied elsewhere, to the end that rules may be wise and uniform. But uniformity, while of the greatest value and highly advisable, so far as shifting local requirements will permit, should not be imposed by the inflexible fiat of central power. Rather, it should come from the common desire of the states to give the highest protection to their people, to regulate traffic in the most efficient manner, with final realization in the attainment of a common standard of perfection.**

**This is the high ideal toward which you are striving and your task is the finding and suggesting of methods of accomplishment. You have already done much by impressing upon the minds of our people knowledge of the terrible toll of traffic accidents. The further course of action and regulation will largely depend upon your recommendations. The undertaking is of supreme value, and you have my best wishes in your efforts.**

n having jurisdiction over the rail-
ys, which should also determine and
force a proper division of the cost
tween the railroad and the public.
ese matters are of such importance
d involve to such an extent the public
fety as to require that priority be
ven to them in the allocation of
pital funds by the railroad, over ex-
nditures for other safety measures
signed to protect the public.

Special traffic courts for handling
lation of traffic laws should be estab-
hed, both rural and city. No un-
ensed person should be permitted to
erate a motor vehicle, and before
operator's license is granted, the
plicant's ability to operate a motor
hicle safely should be determined by
certaining his physical and mental
ness, his knowledge of the laws and
actual demonstration. Such a license
ould not be granted to any person
der 16 or unable to read.

Reckless driving and any other fla-
ant disregard of the rights of others
any user of the street or highway
uld be vigorously and unceasingly
secuted. Adequate penalties should
provided, including the mandatory
ocation of licenses for a specified
gth of time for cumulative evidence
carelessness or irresponsibility, or for
rating a motor vehicle while under
influence of liquor or drugs, and
ere penalties should be provided for
ving during the period of suspension
revocation.

Regulation of speed of vehicles
uld be directed primarily at reckless
ving and should be uniform through-
the country, as far as practicable.
should be unlawful to operate a
icle at speeds greater than are rea-
sonable and proper, having regard for the traffic and the use of the highway, or so as to endanger the life, limb or property of any person. The state law should prohibit any municipality from establishing a speed limit lower than 15 m.p.h. In rural areas, instead of an absolute speed limit, it should be provided that when any vehicle exceeds 35 m.p.h. that speed shall be *prima facie* unreasonable.

All states should adopt the principle of certification and registration of automobile titles as an effective means of reducing thefts and the accident hazards which go with them. Statutes should be passed in every state making it the specific business of some state agency to receive traffic accident reports and to investigate accidents, whether occurring in or beyond the corporate limits of municipalities. It should be made obligatory by law for those concerned to report traffic accidents involving serious personal injury or property damage.

Safety education should be incorporated in the curricula of all schools.

### Administrative and Regulatory Principles

Under this general head, the report recommends uniformity with respect to all traffic regulations, and emphasizes the importance of careful statistics on street and highway accidents, urging their collection, publication and analysis in every state and community. A form of accident report is suggested, as is also the maintenance of spot maps as a means of detecting those points at which accidents occur most frequently.

Special regulation for the use of particular streets, such as the placing of automatic signs and signals, designation of arterial streets, restriction as to class of traffic, direction of traffic, parking privileges, etc., should be based upon competent traffic counts and analyses and established in accordance with some general plan of traffic movement founded upon the design of the street system in each city.

In congested centers where large volume of vehicular movement takes place between points considerably removed, the report suggests that an effort be made to segregate street cars, motor trucks and passenger automobiles on separate thoroughfares.

Under the heading of City Planning and Zoning, the report speaks of the fact that street hazards can be greatly reduced by a proper arrangement of streets and that each community should study its own special problems, with particular emphasis upon elimination of grade crossings with railway lines, classification of traffic with suitable facilities for each, location of traffic-originating centers so as to distribute them, and creation of by-pass highways and belt highways. Other subdivisions under the heading of city planning and zoning treat of day storage space for automobiles, design and equipment of streets, importance of sub-centers and satellites, relation between street facilities and development of private property, playgrounds and schools, inter-relation of traffic facilities, comprehensive traffic and thoroughfare plans.

### Construction and Sign and Signal Standards

Under the heading of Street and Highway Construction, the report deals with roadway width and suggests that every pavement in a city street should be wide enough for at least three lanes of traffic without street cars or four lanes of traffic with street cars. These widths should be multiples of 9 ft. for motor vehicle lanes and 10 ft. for street cars. Right-of-way for parking space and for clear view at curves and intersections, provision for parking space, grades not to exceed 6 per cent, curves of not less than 300-ft. radius on highways of primary importance, cross-section of the pavement and guard railing are other topics treated. A clear view of approaching vehicles for at least 300 ft. should be provided at all points on highways of this character. Every bridge on an improved highway should be least 22 ft. wide.

For signs and signals, both luminous and non-luminous, the conference adopted the following recommendations for color indication: Red for "Stop," green for "Proceed," yellow for "Caution" as at curves; some special cautionary indication at crossroads; white letters or symbols to be used on the red or green background and black on yellow. Distance and direction signs should be black and white.

Railroad crossings remaining at grade should be safeguarded in every reasonable way. Standard warning signs and pavement markings should be used to indicate the approach to all public railroad crossings. Where the volume of traffic requires it, additional protection should be afforded by the use of flagmen, gates or approved electric or mechanical devices. So far as pos-

sible, a clear view along the track in both directions from both sides should be maintained. Sharp curves, abrupt changes of grades, roughness in the pavement or other conditions at or near the track which tend to divert the attention of the motorist should be avoided. Spotting of cars near the highway so as to obstruct the view should be prohibited. Marking and lighting of highways was also treated under this section.

REQUIREMENTS OF THE MOTOR VEHICLE

Pending adoption by constituted authority of a code for standard braking ability, all motor vehicles should be capable of stopping by means of the service brake alone in a distance of not more than 50 ft. from a speed of 20 m.p.h. on a dry, smooth, hard-surfaced road free from any loose material. The emergency brake should be capable of the same performance. Lost motion or play in the steering gear should be limited to about 15 deg. The toe-in of front wheels should never exceed ⅛ in. Clear red should be used for tail-lights and the rear aspect of parking lights, and it should be prohibited for any other exterior lights on the car. Clear yellow should be used for stop lights. The location of spot lights should be limited to the right of the vertical center line of the vehicle and the beam of the spot light should never be directed to the left of the vertical center line. Design of bodies and cabs should be carried out with due regard to the necessity of reducing to a minimum the shut-off area of driver vision. The use of posters or any other obstruction to vision on the front windows or on the windshield should be avoided.

The over-all width of vehicle and load of any motor vehicle should be limited to 96 in. Loading beyond the rated capacity of any vehicle should be prohibited. Adequate and periodic inspection and proper adjustment and repair of motor vehicles are absolutely essential. To this end there should be prepared a simple and practical inspection chart applicable to all makes of motor vehicles, giving particular attention to items affecting safety, for distribution by the Department of Commerce. Public service commissions and other public bodies having control of common carriers operating motor vehicles should establish reports and methods of supervision to insure adequate inspection and upkeep.

Under the heading of Conduct of Drivers and Pedestrians, rules of the road, passing, parking and stopping, hand signals and courtesy are all treated. A single cautionary signal, made by extending the arm well outside the vehicle, is recommended as the one and only signal to be used by the operator of an automobile or motor vehicle about to turn, slow down, stop or back. This is recommended as preferable to a code which attempts to show more exactly what the operator intends to do. A speed exceeding 15 m.p.h. on approaching within 100 ft. of any railroad crossing should not be permitted at crossings where the full stop is not required by law. The use of badly worn tires, especially on the front wheels, should be avoided as a positive source of danger.

The report recommends that education in safety and accident prevention should be incorporated in the curriculum of elementary schools by various means which are enumerated. It deals at some length with suggestions for co-operative work among various associations, unofficial organizations, manufacturers, insurance companies, automobile clubs and public agencies, operators of fleets of motor vehicles, and the schools and colleges. Suggestions are also made for safety education of the public.

Secretary Hoover made it plain th it is not his desire to set up a new p manent national organization devot to safety.

The work of this initial conferen will be followed up as effectively as p sible, and it is probable that it will called into session again one year fr now, to determine how much has be accomplished, and to continue the g eral effort. Meantime, special pha of the problem will be given study by few special voluntary committees technical experts.

# A New Conception of the Job*

## Maintaining Street Railway Personnel Depends on Explaining Company Purposes to Employees and Relation of Individual to Railway—Attitude of Employees Should Be Made Constructive and Conservative

BY S. F. FANNON
Director Department of Public Service, Sherman Service, Inc., Boston, Mass.

IN A MILL, plant or factory, the entire proposition is practically under one roof or at least under several roofs in close physical relation. All the factors are conveniently located and grouped so the management can keep its finger on the pulse from the moment raw material enters until the finished product goes out the other end of the plant. And yet such are the inherent difficulties that even under these favorable physical conditions the 100 per cent successful industrial plants are relatively very few.

In the street railway business you at once find the executive is confronted day and night by an infinitely more difficult situation, on which the following reasons will throw some light:

CONDITIONS DIFFERENT ON RAILWAY

1. His plant (machinery and equipment) is split up into as many unit plants as he has cars in operation.

2. His working force is also split up into as many unit forces as he has car crews in service.

3. Both his unit plants and unit forces are out of sight most of the time. This makes it practically impossible for him to keep his eye on plant or personnel as he could in any other industry.

4. It follows, therefore, that his men work largely without supervision of the kind that every industrial manager would consider essential.

5. Not only must his unit plants, which cost large sums and are subject to heavy depreciation if poorly handled, be intrusted to the care of the unsupervised employees who are charged with the duty of operating the cars, but he must depend on those unsupervised employees to perform a series of important duties, namely: His employee must (1) *manufacture* his product (which is transportation and service to the public); (2) *display* his product to his patrons; (3) *sell* his product to his patrons; (4) *deliver* his product to his patrons; and (5) even *collect* his money from his patrons and turn the receipts in at the cashier's office.

There seems to be no parallel in a other industry where such a demand made on the loyalty and interest the employee. Suppose a worker in factory which manufactured aut shoes, or any article or commodity w charged with duties similar to th of a street railway platform m That factory worker would have work without supervision to manuf ture his product, then he would chan his clothes and go out to display a sell his product. He would come ba change his clothes again, pack up a deliver his product. Then he wo have to go back again to the custom and collect the bill for the product, manufactured, so displayed, so sold a so delivered.

The executives of a street railw have a larger problem in employme than most executives. The platfo man has to perform his duties un unusual conditions. He is obliged stand on his feet a good percentage the time; he must work night or d as the schedule demands, and may m regular meals and have no regu hours with his family. He must exposed more or less to the elements all kinds of weather; he must w every day, week days, Sundays and h days—he must work in contact w the public which represents the patr of his employer, he must virtually present his employer—the company in fact he *is the company* to the av age car rider. These are a few of t conditions that face the street railw executive of today.

You have been hearing a great d in your various meetings and throu your various journals about the ma tenance and upkeep of your properti shops, machines and rolling sto You have heard of and know the imp tance of each in the railway busine They stand out in great prominen but it is indisputable that in all li of industry today the human fac is the controlling factor, and in t street railway business and on yo property the human factor is by the most important factor with wh you have to deal. No matter h modern your equipment or how au matic your machine the success operation of these devices rests

*Abstract of a paper before the New England Street Railway Club, Boston, Mass., Dec. 4, 1924.

rely in the hands of the employee, ctuated by various motives, because a otive, or an interest of some kind, is ehind every act of every man.

A man's motives, more than anything lse, determine his usefulness as an mployee. Now let us make a scientific analysis of the employees in business today. We find in every business hree kinds of motives, and consequently three kinds of employees. I on't mean three kinds of employees y race, sex, creed, language, craft r trade. In this, it makes no difference whether employees are skilled or nskilled labor, or where they work, r what they make.

We find the conservative employee, hose motives are constructive. We nd the negative employee, whose otives are negative and reactionary. Ve find the neutral employee, whose otives are neither definitely for bad or good.

### EN PER CENT CONSERVATIVE, TEN PER CENT DISCONTENTED, REST NEUTRAL

The proportions into which we find working force to be divided into these hree kinds of employees will vary, aturally, but taking a thoroughly ypical case, we find that 10 per cent re conservative, thoroughly contented ith their employer and employment; nother 10 per cent are negative, thoughly discontented with their emloyer and employment; the remaining 80 per cent are neutrals, not ontented as the conservatives are, not liscontented as the radicals are, but ndifferent.

We find that the conservative emloyee gives his employer a full day's work up to the limit of his skill. This neans practically a 100 per cent return for the employer. We find that he negative employee gives his emloyer only 50 per cent or less of a full day's work. And we find that the neutral employee gives his employer 75 per cent of a full day's work. Now, you have always known that these three kinds of employees existed upon your property. You have always known the good employee who gives you a real full day's work and gives it willingly. You have seen his sunshiny face upon the platform of your cars. You have heard his pleasant "good morning." You have noted his assistance of the elderly on and off the car. You have heard his polite reply to numerous questions of the passengers. You have noted his close following of schedule, his interest in the upkeep of the car. He has time and again brought to you suggestions. This is the conservative, the man who is giving to you 100 per cent effort in return for the wages he draws. You have many times noted the man whose face carried the frown, whose very bearing spoke antagonism. He has no interest in carrying out the schedules. It is of no importance to him as to the appearance of his car or to the service he is rendering either the public or the company. This is the negative man—the man who is giving to you but 50 per cent of his ability. And again you have seen that great company of employees whose whole demeanor is that of unconcern. They seem to be saying, "Oh, what's the use, so many hours to put in, so many miles to travel. How soon will we be through?" They keep their eyes on the clock and go listlessly through the motions day after day with but a half interest in their work.

In the maintenance of the personnel in industry we have been very watchful as to the health of the employee. We are selecting with greater care each day the man whose mentality is strong. We are quite alert as to his morals. All these are important and are bound to aid in developing our employee's interest and satisfaction in his work. But do you not realize that the all-controlling power, the real force, is the employee's motives?

Does not the above analysis point out to you that we have another far more important step to take, the development of the motives of the neutral and negative employee to those of the conservative, the developing from this misunderstanding to understanding, from lack of interest in the job to real interest?

It is men we are dealing with, men made in the image of God, men upon whose shoulders rests the responsibility for the development of our civilization and nation. Dare we give to them less attention than we give to a machine? The machine is not working correctly. Do we leave the machine to run on giving under-production? Do we throw it to the scrap heap? No. We call upon the man who understands that machine. He analyzes and locates the trouble. But we do not stop there. We have him put that machine into such condition that it works properly, that it may give to us the desired capacity.

The employee must have brought to him in a tactful way, in a language that he understands, in a way that has a pull for him, the real facts about economics. He does not understand that 80 to 85 per cent of his entire output he buys back, and not only buys back but sets the price of the buying. He does not understand that it is not the number of dollars in his pay envelope that counts, but what the dollars will purchase. He must be told about his position, its opportunities and responsibilities. He must be led to understand the value of the town he is living in, why it is a good place for him and his family, to the meaning of liberty, the value of laws and the courts, the responsibility of citizenship.

Here is the problem that faces us today. It requires the most intimate knowledge of humanity. It is a challenge of the most scientific sort. But I am glad to be able to say that it is being accomplished. Skillfully, scientifically, through great study and deep research, scientists are leading the employees of various industrial organizations to a clear conception of their responsibility and obligation to a motive that puts interest into the job that is theirs to perform.

# Eliminating Street Car Noises*

## Numerous Sources of Noise on the Car Are Pointed Out and Remedial Measures Suggested for Each—A Higher Standard of Maintenance the Main Remedy

By R. W. Bailey
Superintendent Power and Equipment Kansas City Railways

SINCE the advent of the rubber-tired vehicle into the transportation field the noise emanating from metal wheel on metal rail, with the many contacts of metal to metal in trucks, brake rigging, etc., has become a source of annoyance. Noise is more or less a relative thing. Whether or not a thing is considered noisy is generally determined by comparison with other sounds. A car that would be considered extremely noisy today, ten years ago would have been considered a quiet running vehicle. With the clatter of the hoofs of horses, rolling of steel-tired wagon wheels over the street, etc., the noise from a street car was given very little consideration. Times have changed and something must be done to reduce the noise made by street cars.

The first question that confronts the mechanical department of the street railway today is the elimination of noise in the cars we are now operating. It must be remembered that many of these cars have been in service for from 5 to 20 years. In the design of this equipment very little attention, if any, was paid by the manufacturers to the elimination of noise. Metal to metal contacts, without any particular attention to close fits, make a condition that is hard to control. For instance, the present brake rigging on our cars consists of numerous floating parts joined together by pins and bolts. Our trucks, journal boxes and lids, springs and spring clips, air compressors, drawbars and attachments, motors and motor suspensions, gears and gear cases, door engines and step mechanisms, all body noises, and trolley bases and trolley wheel noises, all contribute more or less to the general noise made by the car. Last, but not by any means least, is the condition of the track over which the equipment is to operate. However, assuming that the track is in fair operating condition, with not more than the usual number of loose joints, corrugated rails, cup joints, etc., there are many parts of the equipment that can profitably be given increased attention. Just how far we can go in making cars quieter depends to a certain extent on the amount of money that is to be spent.

Wheel noises are largely due to vibration in the metal of the wheel itself. At a meeting of our mechanical men held recently two means of muffling this ringing were discussed. One method consisted of drilling additional holes in the web of the wheel and the other contemplated bolting oak blocks or pieces of lead plate to the web to deaden this ringing noise. We are attempting, with cast iron wheels, to produce the same results by putting a lead plate between

*Abstract of paper presented before meeting of Midwest Electric Railway Association, Nov. 24, 25, 1924, at St. Louis, Mo.

large washers and bolting onto the wheel. While this deadens the sound, it has not as yet been demonstrated that it is practicable. We are still following it up with great interest. Flat wheels are another source of disagreeable noise and if properly inspected and ground these can be practically eliminated. However, under certain conditions they are so frequent that the expense of properly removing the flats promptly is prohibitive and the wheels are allowed to continue in service.

A cushioned wheel is being manufactured and is now in service on steam railway inspection cars. Application of this construction to street cars would undoubtedly materially reduce the vibrations that are set up in the wheel and transmitted to the equipment. Just how far this would go to eliminate noise must be demonstrated, but it is worthy of serious consideration.

### Journal Boxes and Brakes

Journal box noises originate from wheel impacts transmitted through the journals to journal box covers and such parts of the truck as make metal to metal contact. The wear plates on pedestals should be kept tight. Some types of journal boxes are also provided with plates that should be given the same attention. We have decided to do away with all spring lids on our present journal boxes and have devised a method whereby all lids are now bolted tight in place. We have also tried a few wooden lids to see what success we might have.

Brake noises are due in many instances to the fact that not enough attention is paid to the fit of the brake head and shoe. If a shoe is properly fitted to the brake head and properly keyed there should be very little noise at this point. Closer inspection as to the replacement of brake heads undoubtedly would eliminate considerable noise. Swinging brake beams, brake levers, equalizers and brake rods are another source of noise, and it seems that about the only proper thing to do is to maintain closer fits, taking care of pin wear and bushing renewals and making fits on clevices as close as possible, without binding the brakes. This is a matter that I think we have all overlooked more or less. Also, attention should be directed to seeing that brake rods are properly supported so that they will not be striking other equipment or the car body.

### Trucks Contribute Also

Trucks that have not been well maintained and on which worn parts have not been replaced, generate noises at many points. The disagreeable noise made by motor gears is due primarily to the fact that we do not maintain close centers between gear and pinion. We have all been trying to get the longest life possible out of all types of bearings for purposes of economy, and noisy operation has been the result. Worn axle brasses, by permitting gears to mesh poorly, are thus one of the chief causes of noise. It may be because axle brass renewal already is one of the largest items of equipment maintenance cost that we tend to overlook the noise from this source. If axle brasses are removed before the gears become noisy the present limits of wear allowed will have to be decreased materially.

This question also involves serious consideration of gear cases. When properly installed they cause little noise, but when the gear is out of alignment or off center, the case acts as a sounding board to magnify these noises. Excessive lateral wear in armature and axle bearings will allow the gear or pinion to strike the case and it then becomes very noisy indeed. Proper lubrication of gears, in fact of all moving parts, is another important factor to be considered in connection with this subject.

Body noises originate from many causes and include a wide variety of squeaks and rattles resulting from service strains and from loose parts. The body and vestibule sash, body doors, register mechanism and many other fittings are the chief sources. Special attention should be given to keeping sash tight, as they are one source of particular annoyance. Also, many rattles can be removed by taking care of the fits of doors and their operating mechanism.

All of us, probably on account of the necessity for economy, have been giving more attention to our maintenance cost per car-mile than to the fact that the car is not as pleasing to the public as might be desired. Our first job, therefore, is to raise the standard of maintenance so as to eliminate noises resulting from loose or worn parts. After that the use of fiber and lead or other sound-deadening materials may be experimented with profitably.

In my opinion, noise reduction is a progressive problem, and if we are able to control what we now consider the loud and disagreeable noises in our equipment, other noises will become apparent and seem objectionable that at the present time are not giving us any concern. For instance, if all other noises were quieted, the noise of a compressor would probably be very objectionable. Also, the drumming reflected to the car roof from the trolley wheel would probably become objectionable. In other words, noises which are not taken into consideration at all at the present time eventually may become an annoyance. Consequently there is a big job ahead on our old equipment.

# Modern Methods an Economic Factor in Car Maintenance*

By Henry S. Day
Manager Transportation Division, Westinghouse Electric & Manufacturing Company, Boston, Mass.

IN THE many discussions of modernization very little has been said of the need of equally modern methods of maintenance and the savings that could be accomplished by them. In what follows I am using the electric car as the dominating factor because all things on an electric railway start and finish at the car. The universally accepted method of discussing economies of operation is by comparison, and to this end I will quote costs and describe practices gathered from some 50 roads during the past 18 months.

On four roads, where operating conditions are similar, the total mechanical department cost per car per year was in round numbers: Road A, $866; Road B, $950; Road C, $1,200, and Road D, $1,800. On each of these roads the annual car-miles was practically the same, the cars and equipment were equivalent in weight and power and were built largely by the same manufacturers at approximately the same time. It is interesting to note that on Road A 60 per cent of the equipment was modern and on Road D there were practically no modern cars or equipment.

The Northern Texas Traction Company, which at the time of the Coffin award showed a maintenance cost per car-mile of 1.9 cents, was operating 85 per cent modern light-weight cars and the Eastern Massachusetts Street Railway, referred to as road A, which was operating with a cost of 3.5 cents per car-mile, had only 60 per cent of its cars of the modern light-weight type.

Road A, with a cost of $866 per car per year, has a definite and constructive overhaul program carried out strictly along modern lines, while road D, with a cost of $1,800 per car per year, has not overhauled its cars for 6 years. On road B, with a cost of $950 per car per year, the low cost was obtained almost entirely by modern methods of maintenance, as all passenger cars in service are of composite wood and steel double-truck type, the average weight being 42,000 lb.

It seems surprising that cars of the same type and weight, not infrequently built by the same car builder, equipped with the same motors and in equivalent service should cost some $900 more per year operating in one city than it did in another.

The road that was spending $1,800 per car per year had more than 300 cars in service. If this operator had gotten his cost down to $866 he would have saved more than $900 a year on each car. This would have reduced his mechanical department costs about $270,000 per year, and would have wiped out the operating deficit.

Figures obtained from nine roads showed that the average cost for material only on each road ranged from $22.08 to $63.04 per motor per year. The additional labor charges in the total cost of maintenance varied from 47 per cent to 73 per cent of the material cost.

On 10 roads the total cost of materials and parts for 17,469 motors was $410,272, or an average cost per motor per year of $23.48. With the labor added this makes the cost per motor around $50 per year. On these same roads the material only charged to car account for electrical equipment for

*Abstract of a paper before the New England Street Railway Club, Boston, Mass., Dec. 4, 1924.

four-motor cars, showed the cost per car per year to range from $113.42 to $268.18. These great discrepancies in cost at least hint that the maintenance methods employed lacked standardization or, if you please, modernization. To bear this out it is found that a gear, armature winding, bearing or other part has a much longer life on one road than another, although made by the same manufacturer out of the same material and put to work in the same service.

The question is frequently raised that local conditions create influences that cannot be controlled, particularly those of the weather and elements. We used to think that the worst thing that could happen was a snowstorm. This idea is becoming out of date, with a good many others. For example, in the past 5 years the average per cent of armatures in service rewound by the Montreal Tramways is 9.36. On this road the average motor performance per armature rewound in the 5-year period was 252,200 miles. On the basis of 36,000 miles per year an armature would go 7 years between windings. So if equipment is in good condition "local conditions" are not the factor in operating costs that they have been claimed to be.

Recently an association of equipment men published two reports, showing cost per 1,000 car-miles and miles per pull-in. The reports were gotten up to show the improvement brought about by the good work of the association, which apparently was very effective. The striking thing about these reports seemed to be that in a group of eight roads, the total mechanical department maintenance per 1,000 car-miles ranged from $18.43 to $38.13, and the total miles per pull-in from 6,189 to 46,062. It is also significant that the cost of operation on the road with the poorest showing in pull-ins was greater than on the road with the best showing. To continue the comparison, a road in New York state is operating motors with the original gears, gear cases and some of the pinions which were placed in city service 10 years ago, still in good condition. On this road, operating about 100 revenue cars, one man does all the winding, using only a part of his time. A road in Michigan rewound, last year, 125 per cent of the armatures in service.

### Different Bases of Overhaul

Some roads inspect and overhaul on a mileage basis, some on a time basis, some on a watt-hour consumption basis. Others carry on inspection and overhaul by a system of light and heavy repairs as necessity dictates or equipment failures make compulsory. Overhaul periods on different roads vary from 45,000 miles or about 16 months between overhauls to 100,000 miles or about 33 months.

As a matter of fact any of the overhaul and inspection systems previously mentioned will keep cars in service with what is generally considered dependable operation. But it is also equally a matter of fact that but few of these methods keep cars in service economically when the possibilities of that economy are really analyzed.

Cars can be kept in service and maintained at low cost and with infrequent failures when new. Therefore, the system of inspection and overhaul that perpetuates the original condition, of course taking into account the yearly increasing age, is the one that will come closest to this standard and result in the lowest cost. A system like this will bring the cost of maintaining the average city street car down around $1,000 per year, with only approximately 5 per cent of the total cars out of service for overhaul, paint, collisions and running repairs. Today it is not unusual to find anything from 5 per cent to 25 per cent of the cars out of service for various reasons. The annual dead car hour cost is equal to a big sum.

The electric railway operator must come to the view point that constructive economy lies in higher standards and better methods, and that truly cheap maintenance means the care of rolling stock, power houses, line, and track along the lines intended by the engineer and manufacturer who was originally responsible for their production. That some operators have not done so, and have daily paid for it is evidenced by the very discrepancy in costs and operating records obtained from different roads. There seems no logical reason why two cars or equipment units made by the same manufacturer and placed in service at the same time in different places should at the end of a few years show widely varying results. Yet such is the case—neither can there be any question that the result is in direct ratio to the degree of skill and care exercised in the upkeep.

It is not unusual to find workmen with little training or skill and no comprehension of fits or close measurements, dismantling, repairing and assembling equipment and apparatus which had to be designed and built to what were practically micrometer specifications, in order successfully to meet operating conditions.

Modernization of methods of course means modern shops, tools and facilities. Baking ovens, spray painting, spray washing, large lye vats, power operated cranes and trucks, electric and gas welding, heat controlled babbitt pots, pneumatically or electrically operated hand tools are modern necessities. Light, comfortable shops, arranged to economize time and do away with hand labor will in themselves permit large economies. But these things alone will not reach the economies that can be attained by modernizing methods, which really mean constructive planning for and co-ordinating of the maintenance demands according to the character and requirements of the physical property. Higher standards and thorough execution of constructive maintenance schedules on a budget basis with an accurate method of tabulating costs backed up by engineering supervision and advice is another way of applying modernization of methods to any property.

For some reason hard to explain, this question of maintenance has never seemed to come into its own. The day isn't coming, but is already here, when reduced operating costs are going to decide to a large degree the question of profitable operation.

# Quantity Production of Renewal Parts*

By H. R. Meyer
Westinghouse Electric & Manufacturing Company

An analysis of several railway properties indicates that a careful study of maintenance methods with more thought given to the selection of renewal parts has been materially reflected in the earning capacity of these properties. Nine times out of ten the cost of the renewal part itself is only a relatively small percentage of the cost of replacement. The big costs are in the removal of the car from service and the labor cost.

A general survey of the renewal part production in this country will show that the great majority of electric railways manufacture their own renewal parts to a greater or lesser degree and the numerous independent manufacturing concerns are also engaged in this business, with the result that large quantity production is not practiced. Many electric railway men are of the belief that they can manufacture their renewal parts cheaper than they can buy them. In some instances this belief may be justified, but in the great majority of cases it is not supported by facts. Several companies which have made a close study of this subject have learned that it was a mistaken policy.

Manufacture of renewal parts by an operating company is entirely uneconomical from the standpoint of manufacturing standards as they exist today. The mechanical department of a street railway is fundamentally a maintenance organization. This organization is laid out on lines almost entirely foreign to that of a manufacturing company in that its work consists in the repair of apparatus rather than its design and fabrication. In some cases the plea is made that the use of maintenance men for manufacturing purposes is warranted on the basis that there are many occasions when some of these men have nothing to do. If this is actually the case, then there is room for improvement in the layout of the maintenance work. If the street railways had today a suitable system of cost accounting in the shops, we are firmly convinced the records would show that the cost of manufacturing is higher than the cost of the best material which can be bought on the market today.

On an average, the number of pieces of any one part is not large enough to warrant the setup required for the production of that part for one operating company. As the cost of the setup and handling operations must be included in the total cost of the job, each piece when a small number is involved must bear its share

*Abstract of a paper presented at the convention of the Pennsylvania Street Railway Association, Harrisburg, Dec. 5, 1924.

of this setup. This is too great a percentage of the total cost of the piece. In a plant which manufactures nothing but renewal parts for general maintenance consumption, the price of the unit can be based on large quantities, as the shop load for the particular part in question can be figured on the total number of completed pieces of apparatus in use throughout the country and not on just one property.

Have you ever considered the question of the proper tools required for manufacturing any part in quantities at a low cost? Each time another concern takes up the question of manufacturing a part which is already on the market, the cost of a new set of tools, jigs and fixtures is involved. This is a very uneconomical procedure and tends to keep the cost of a product up. Probably the most serious phase of this situation lies in the fact that as a rule the tool equipment is insufficient for an accurate reproduction of the renewal part. It stands to reason that to keep the cost down as few tools as possible are going to be made. This is not just a general statement but rather the result of many comparisons made between standard parts and those of other manufacture.

To manufacture renewal parts which will pass inspection as called for by the drawing information, the best of machinery equipment is required. A renewal part to give satisfactory service must be made to the exact dimensions of the part which it replaces. If this is not the case, the cost of a second replacement in labor alone would more than offset any saving which the home manufacture made. A survey of the street railways which was made a very short time ago showed that the average age of lathes now in service was twenty years. Manufacturing experience indicates clearly that close dimension work with duplication of parts cannot be obtained at low cost with such equipment. As the operation of the complete apparatus is dependent on the design and manufacture of the integral parts, it is evident that the tools for the renewal parts must be as near perfect as it is possible to obtain them. Only a good load factor will permit the investment for such tools.

The materials which go into a renewal part are of as much as if not more importance than the general appearance. Often is it possible to obtain at a low price reproductions of standard parts which resemble somewhat the high grade article. The question is, however, of what material is it compounded? The manufacturer of renewal parts should be constantly working toward the ultimate goal of perfection as it affects maintenance rather than that of first cost. To do this it is necessary to keep in touch with up-to-date research developments in materials and processes. A corps of trained engineers should be working on these problems at all times, testing all commercial products for the best and devising new methods of obtaining high quality materials when they are not available on the market. No materials should be used which do not come up to definite specifications laid down by these engineers. This service can only be available where the renewal parts receive only a very small proportional share of the expense.

When the operators manufacture their own parts, the materials for the fabrication are bought on price and hence are not necessarily of the best. An examination made of the materials used in a number of coils proved this point almost conclusively. Scrap materials for such items as bearings may be of almost any composition by the time they are cast, and hence the wall of the bearings may be brittle and coarse grained in structure, all of which tends to lessen their life.

As a rule, the men employed in the manufacture of renewal parts are inherently maintenance men. However, in many cases their time is split between the maintenance of equipment and the manufacture of parts. The supervisory force employed in the manufacture of renewal parts in most cases also has charge of the maintenance work. Does it not seem probable that under such conditions either one or the other of these two duties will suffer through this combination? The needs of an operating company in its maintenance work are so diversified and the quantities as a rule are so small that the support of a complete and separate manufacturing unit hardly seems justified.

### The Question of Tolerance

Not so many years ago the question of tolerance on renewal parts as they affected the maintenance was one of seemingly minor importance. With the improved maintenance methods of today, and hence a greater appreciation of the necessity for correct tolerances, this question is of foremost importance in some of the major problems. You realize the importance of correct tolerances on your axles, wheel and gear bores because the effect of incorrect tolerances is immediately apparent in loose wheels and gears. This is not so true on many of the other parts of the equipment, as they will at least operate in some fashion. If you are subject to an epidemic of hot bearings and consequent troubles, you will become vitally interested in this question of tolerances and the effect when the improper ones are used.

Consider the question of brush-holders. The original manufacturer is very careful to see that the proper dimensions are adhered to from a consideration of neutral setting. If this question of neutral point of the motor is a vital one, then it is very necessary that all renewal part brush-holders be made to the same dimensions as the original. Unfortunately there are many renewal part brush holders in the manufacture of which this point is entirely neglected.

Probably in no way is the answer to tolerances so well exemplified as in the case of armature bearings and armature bearing housings. This particularly as it applies to change in gear center distances, overheated bearings and poling of armatures, with especial regard to lubrication. The life of a bearing shell is dependent to a very great extent on its fit in the housing. A loose fit of the bearing not only shortens its own life but makes necessary in many cases the reboring of the housing before a new bearing should be used. Noise in gears is mostly attributable to worn gears. However, a very large percentage of this noise is due to improper meshing caused by incorrect gear center distance. The wear of gears and pinions is increased by changes in gear center distances due to worn and improperly fitting parts. New gears and pinions under these conditions will be noisy.

Many renewal parts are made to drawing on which no tolerances whatsoever appear. Some of these drawings are made up by measuring parts for which, if tolerances were allowed, an error is bound to creep in.

Probably no one thing contributes more to the successful operation of a renewal part than the inspection which it receives before it leaves the point of manufacture. Adequate inspection of parts costs money, but it is just one of many things which must be done to service properly an operating company's requirements. Here again the load factor on any renewal part must be large enough so that each part will only have to bear a small proportion of the cost. If a clear conception of the importance of tolerance is conceded, then the importance of inspection is understood. This question of inspection is often neglected in the manufacture by operating companies.

In some cases it has been found that stocks of renewal parts exist in operating storerooms which far exceed the requirements for many years. This condition has been brought about by the necessity for making large quantities to keep the cost down. Quite a number of these parts are for apparatus which has become obsolete and therefore the remaining stock represents a total loss. The book value of this material and the interest loss is another factor which tends to offset any estimated gain through internal manufacture. When the manufacturer stands ready to protect your needs by local stocks at all times there is very little argument left for the operator to manufacture his own parts.

One large operating company estimates that by eliminating the manufacture of parts it will reduce its payroll by very nearly $100,000 per year. This does not mean a total saving of that amount, but a very, very good percentage of it will show up as a saving.

## Indorses Better Business Methods

AT THE last meeting of the executive committee the policy committee was authorized to draw up a resolution indorsing the work of the Better Business Bureau and the National Vigilance Committee. The resolution follows:

"Recognizing the effectiveness of the work being done by the National Vigilance Committee and the Better Business Bureau in protecting the public against fraudulent, semi-fraudulent and hazardous investment propositions, this executive committee hereby indorses the work of both organizations. It urges member companies to support these organizations locally and nationally and to co-operate with them in whatever manner seems advisable."

# American Association News

## Arc Welding Discussed Before Metropolitan Section

A. G. BISSELL, arc-welding engineer of the Westinghouse Electric & Manufacturing Company, was the principal speaker at the meeting of the Metropolitan Section of the American Electric Railway Association in the auditorium of the Engineering Societies Building in New York on Dec. 12. His subject was the "Metallurgical Analysis of Electric Arc Welding" and he illustrated his remarks by means of lantern slides. He said that an electrode wire of hard drawn mild steel contains an average chemical composition of carbon, 0.16; manganese, 0.56; phosphorus, 0.032; sulphur, 0.024, and silicon, 0.016 with a tensile strength of 100,000 lb. per square inch. In passing through the arc, this metal in the molten and vaporized states comes in contact with the elements of the air, the extent of this contact being determined by the length of arc held by the operator. The shorter the arc, the less the metal is affected by the atmospheric elements. At the temperature of the arc the main elements of the air, oxygen and nitrogen, have a great affinity for the metals in the arc stream. The result of this affinity is that the nitrogen and oxygen combine with the elements of the wire to form oxides and nitrides. The carbon of the wire combines with the oxygen of the air to form carbon dioxide and carbon monoxide. Both of these compounds are gases and escape. The oxides of iron, manganese and silicon float to the surface of the molten metal as slag. The phosphorus and sulphur are altered but little. The nitrogen combines mainly with the iron. Some of each of the oxides and nitrides are scattered throughout the metal, but the extent of this is determined by the amount that is permitted to enter by the operator. An analysis of the metal after passing through the arc shows the following elements: Carbon, 0.05; manganese, 0.18; phosphorus, 0.031; sulphur, 0.036; silicon, 0.011; nitrogen, 0.114-0.138, and oxygen, 0.55-0.25 per cent. The tensile strength is from 55,000 to 62,000 lb. per square inch.

By holding the arc between ⅛ in. and ⅛ in. the arc stream is completely surrounded by an envelope, mainly of iron oxide vapor, that prevents the active oxygen and nitrogen on the outside from coming in contact with the active elements on the inside and permits a fairly pure metal to be deposited on the work.

By melting the steel wire and again solidifying it cast steel is produced, and at the same time the crystalline structure of the plate metal in the immediate vicinity of the deposit is altered. Photomicrographs show a section of metal extending from the added metal through the line of fusion into the plate in one layer. The light metal is of a cast structure. This is the deposited metal and consists of iron of the analysis given above. This structure blends into a different structure at the line of fusion between the plate metal and the deposited metal. The heat conducted through the plate away from the line of fusion produces structures corresponding to the temperatures reached. The dark, coarse structure is characteristic of an overheated steel and is brittle. This material extends about 0.015 in. into the plate. Further into the plate the grains grow smaller until the minimum size is reached at the point where true annealing occurs. Here the temperature reached is about 780 deg. C., or just above the critical point of the steel. The material at this point has a tensile strength of about 60,000 lb. per square inch and an elongation of about 25 to 30 per cent in 2 in. Further on the structure again coarsens, blending into the original structure of the plate. The crystals of each metal are perfectly enmeshed. The added metal may be identified by the inclusions of oxide and nitride that appear as black specks in it.

The principal discussion was by J. S. McWhirter of the Third Avenue Railway. The general opinion was expressed that electric railway operators had much to learn from the applications of arc welding carried out by the steam railroads.

Myles Lambert of the Westinghouse Company responded to the invitation of President Thompson of the section by addressing his remarks more particularly to the young men in the industry, and by making a plea for everybody engaged in electric railway work to do more to sell the industry to the public. Mr. Lambert said that the educational opportunities of the day were almost limitless and he urged all the men in the industry, particularly the younger men, not to leave any stones unturned in their efforts better to fit themselves for their jobs and for their work as citizens and as members of the community. He said that the interest of railway men everywhere was not only in the perfection of the physical apparatus with which they worked, but with the problem of studying how people regarded the service that was being rendered.

Secretary Hodges said there was a balance of $1,259.46 in the treasury and that since the last meeting the membership had increased 157, or from 569 to 726 members.

Mr. Thompson said that a broad program had been laid out for the year—one that he hoped would touch intimately the work of every man engaged in the industry. On each property included in the territory covered by the Metropolitan Section at least one man has been appointed who will keep in touch with the members in order to find out what subjects were uppermost in the minds of the men. In that way it could best be learned what the men desired to hear discussed.

May Singhi Breen and her Syncopators furnished the principal entertainment. They were roundly applauded. Miss Breen broadcast from Station WEBJ of the Third Avenue Railway, and the stage of the auditorium in the Engineering Building was equipped with a microphone and wires and announcements were made over the microphone to the invisible audience, but at the conclusion of the performance the announcer detached his instrument and darted off the stage while it was dawning on the audience that the broadcasting stunt was only a hoax.

## Committee of 100 Disbands

ITS purpose accomplished, the Committee of 100, which was formed for the purpose of furthering the dissemination of correct information regarding the industry, will disband Jan. 1. Announcement to this effect was made in a letter sent by Gen. Guy E. Tripp, chairman, to each member of the committee. The letter follows in full:

"The Committee of 100, of which you are a member, will be dissolved on Jan. 1, 1925, on which date the American Electric Railway Association will take over its funds and work, and as chairman, I wish to take this opportunity to report to you what we have accomplished in the 5 years of our existence.

"The work for which the committee was originally organized, that of saving electric railways from seemingly imminent danger of general bankruptcy, by telling the public the facts about the industry, has been accomplished. Machinery for reaching the public with the industry's story was set up shortly after the organization of this committee, and this machinery has been perpetuated in its original form, enlarged and kept functioning under funds raised by the committee ever since.

"Initially, in 1919, the committee funds were expended in giving to the public facts developed by the Federal Electric Railways Commission, and such good results were accomplished by the publicity machinery then set up that it was transported to the American Electric Railway Association headquarters in New York, and since that time has functioned under the name of the Advertising Section of the association. Included in the beneficial accomplishments of this Advertising Section in the last four years are these:

" 'Established a point of contact between the electric railway industry and writers for newspapers, magazines, financial papers and other publications interested in electric railways through which they could obtain authorized information, including statistics, regarding the electric railway industry. This service, by its frank and honest dealing with publications, enjoys the highest standing and today is being utilized throughout the country.

" 'Encouraged electric railway companies to improve their public relations by frank dealing with the public, and caused the number of companies using publicity and advertising to increase during the 4-year period from about twenty to more than three hundred. The total amount of money now being spent for electric railway adver-

tising and publicity annually chiefly through local company channels is estimated at $3,000,000.

"'Originated an advertising service for the dissemination through electric railway companies of posters, suggested newspaper advertisements, booklets, etc., carrying authenticated information about the industry. This service is supplied regularly to all electric railway companies in the United States.

"'Aided in the organization of state companies on public utility information and arranged a co-operative arrangement with them whereby newspapers, state legislators, city officials and libraries and colleges in the 37 states where the committees operate are supplied regularly with electric railway material.

"'Enlisted for the first time the co-operation of manufacturers of electric railway materials employing some 200,000 men in telling the facts about electric railways to the public.

"'Made personal surveys of and gave national publicity to such outstanding electric railway situations as those which have arisen in Des Moines, Iowa; Okron, Ohio; Saginaw, Mich.; Toledo, Ohio, and Bridgeport, Conn., in which the bus sought to supplant electric cars.

"'The Advertising Section has worked in close harmony with the executive committee of the A.E.R.A. and all of its activities have been carefully supervised by leading executives of the industry. The universal opinion of association executives familiar with the section's work is that it has accomplished effective results and that its efforts should continue along the general lines followed heretofore.'

"Happily, the finances of the association are in such condition that it is now able to carry on the educational work heretofore financed by the Committee of 100. Hence, the executive committee of the association on Nov. 21 officially made arrangements for financing the work after Jan. 1, 1925. Effective that date, therefore, the Committee of 100 will stand dissolved.

"Coincidentally, the executive committee adopted a resolution thanking the Committee of 100 for the excellent work that it has done since its creation. To this I wish to add a word of appreciation. This committee doubtless has been of great service to the industry, and I thank you personally for the assistance that you have rendered."

## Heavy Traction

A MEETING of the heavy electric traction committee of the Engineering Association was held at association headquarters, New York City, on Dec. 17. Members present were J. C. Davidson, chairman; A. H. Armstrong, J. M. Bosenbury, H. F. Brown, Morris Buck, H. W. Cope, J. H. Davis, J. T. Hamilton, Norman Litchfield, J. O. Madison, L. S. Wells and C. R. Harte, sponsor.

Mr. Wells was appointed chairman of a sub-committee to review existing standards. It was suggested that a representative of this committee review the subject of zinc coatings for steel, now under consideration by a sectional committee of the American Engineering Standards Committee.

Mr. Brown, chairman of the sub-committee on revision of the bibliography of heavy electric traction, stated that the work has been carried out by Prof. Warner. This work is now nearly complete as regards American references. A motion was adopted that the American portion of the work be completed. The subject of collection of data on branch-line electrification and self-propelled cars was continued, with A. H. Armstrong as chairman of the sub-committee. The study of train operation, with particular reference to articulated trains, was referred to a sub-committee, with A. H. Daus as chairman. A sub-committee was appointed to check up and revise the tabulation of mileage, car and locomotive data of electrified steam railroads, with Mr. Cope as chairman.

## Valuation

A MEETING of the committee on valuation of the American Association was held at association headquarters, New York, on Dec. 15 for the purpose of organizing and laying out the work for the coming year. Those present were F. W. Doolittle, New York, chairman; Francis Blossom, New York; H. A. Clarke, New York; W. F. Downs, Philadelphia; J. A. Emery, New York; T. E. Francis, St. Louis; C. W. Gillespie, New York; L. R. Nash, Boston, and A. S. Richey, Worcester, Mass.

It was decided to continue the work which the committee has been carrying on for several years in clarifying the status of valuation work. Several new subjects were proposed and discussed. Their inclusion in the program for the year was left to the discretion of the chairman. The next meeting will be held in connection with the Midyear Meeting at Washington.

## Power Generation and Conversion

A MEETING of the committee on power generation and conversion was held at association headquarters, New York, on Dec. 15. Those present were L. D. Bale, chairman, Cleveland; C. E. Bennett, Atlanta, Ga.; W. E. Bryan, St. Louis, Mo.; C. A. Butcher, East Pittsburgh, Pa.; H. W. Codding, Newark, N. J.; H. T. Connolly, Annapolis, Md.; N. R. Love, Denver, Col.; F. W. Peters, Schenectady, N. Y., and V. H. Mueller, representing G. W. Saathoff, New York, N. Y.

Discussion centered on the various subjects which had been assigned to the committee for consideration and report during the coming year. Plans were outlined for carrying on the work, and four sub-committees were appointed. In regard to automatic substations, it was decided to review last year's report and add new information, and also to devise a classification to take care of substations manually operated all the time or part of the time and to include substations having semi-automatic and full automatic protection. The subject of remote supervisory control is to be studied with a view of obtaining additional data in regard to systems used for recording and indicating loads. New developments in supervisory control are to be considered.

A program was laid out in regard to the subject of ventilation and noiseless operation of substations. It was decided that test data in regard to ventilation as affecting temperature were desirable, and the committee decided to lay out a system of tests that should be made so as to collect data. The intention is to have some very complete tests made at various railway properties. It was considered desirable to obtain a steel bolt specification, and the committee is to go over the field and obtain specifications where possible, in order to make definite recommendations.

G. W. Saathoff was appointed chairman of the committee to study existing standards and also of the committee to obtain steel bolt specifications; H. W. Codding was appointed chairman of the committee on automatic substations, and F. W. Peters was appointed chairman of the committee on ventilation and noiseless operation of substations. W. E. Bryan is chairman of a special committee consisting of members of the power generation and conversion committees and the power transmission and distribution committees to study and codify power failures.

## Power Transmission and Distribution

THE organization meeting of the power transmission and distribution committee of the Engineering Association was held at the Engineers Club, New York, on Dec. 15 and 16. The following subjects were assigned to sub-committees for consideration:

Concrete pole design, F. McVittie, chairman; block signals, J. M. Waldron, chairman; catenary overhead construction, A. Schlesinger, chairman; composition and wear of trolley wire, H. S. Murphy, chairman; temporary connections to trolley wire, J. F. Neild, chairman; overhead construction for trackless trolley, F. McVittie, chairman; return circuit, J. Walter Allen, chairman; review of Manual sections, Adrian Hughes, Jr., chairman. D. D. Ewing, J. F. Neild and A. Schlesinger were appointed to represent the committee on the joint inductive co-ordination investigation.

It was decided to hold a meeting of the committee at Chicago some time in March and a final meeting in New York at the call of the chairman.

The first day's session was given over to a general discussion of the subjects for the year, after which the main committee meeting adjourned and the various sub-committees met to outline their work specifically.

Those present were C. H. Jones, chairman; J. Walter Allen, S. M. Day, J. H. Drew, Charles Gilman, H. W. Griffin, C. J. Hixson, C. L. Hancock, H. W. Cooke, F. McVittie, H. S. Murphy, W. J. Quinn, W. Schaake, A. Schlesinger, J. M. Waldron, F. J. White, J. C. Damon representing W. H. Bassett, M. B. Rosevear, sponsor, and G. C. Hecker, special engineer.

# The News of the Industry

## Atlanta Traffic Study Presented

**Expert's Report Contains Several Unusual Suggestions—Moving Platform Among Them**

Removal of all street car tracks on Peachtree and Whitehall Streets between Ellis and Mitchell Streets in the downtown section of Atlanta, Ga., and the installation of moving underground platforms for the transportation of pedestrians at an approximate cost of $2,500,000 are two of the principal items in the report of John A. Beeler, New York, who has been engaged for the past six months in making a traffic survey of Atlanta at the joint request of the City Council and the Georgia Railway & Power Company.

Other recommendations include the erection of viaducts over the railroad tracks at both ends of the old Union station at Pryor Street and Central Avenue; the rerouting of practically every street car line in the city; the establishment of a co-ordinated coach system to eliminate the jitney problem by operating buses in connection with the street car system; the widening of several principal streets and the creation of alternate trolley and automobile boulevards.

While exact figures on the recommendations have not yet been made public, it is understood that it will cost $10,000,000 to carry out all the changes recommended. According to Mr. Beeler his recommendations will, if put into effect, take care of Atlanta's traffic problem for at least 30 years.

The most unusual feature of the recommendation is, of course, the proposed moving platform. The subway would be equipped with three continuous platforms. One set of platforms would run north on one side of the street and the other south on the opposite side. The inner walk would move at the rate of 6 m.p.h., the intermediate one at the rate of 4 m.p.h., and the outer one, or one nearest the stores, at the rate of 2 m.p.h.

According to Mr. Beeler it would be impracticable to widen either Peachtree or Whitehall Street. It is felt, however, that the elimination of the railway and the construction of the subway will not only solve the problem but will be a real advantage to merchants in the downtown section.

Mr. Beeler has also proposed the construction of alternate automobile and trolley boulevards. Present car lines would be rerouted on the adoption of this system, and the lines would go straight through town, some north and some south, looping in the suburbs to form a continuous system.

The four streets on which cars are to be operated would provide for one north and one south line on each of the principal thoroughfares, and this would do away with all of the loops, crossings and turnings in lines which make Atlanta's traffic situation a nightmare at present.

Another important recommendation is the operation of an auxiliary system of buses by the railway as the best means of meeting jitney competition. This section of the report contains a carefully worked-out plan for bus lines to supplement street-car lines.

The entire report is in eight sections. It includes recommendations on the moving sidewalk subway, the construction of the viaducts across the railway tracks, the creation of alternate automobile and street-car boulevards, the rerouting of car lines to form a simpler and more effective system, and the operation of bus lines to supplement street car lines and compete with jitney competition.

## Business Will Be Improved by Reparations Settlement

**Herbert Hoover and Owen D. Young Outline Results Expected from Adoption of Dawes Plan—Mr. Young Said Plan Could Not Have Been Adopted Without American Participation and Must Have American Co-operation to Succeed**

COMMERCE will be restored, productivity increased and employment bettered as the result of the adoption of the Dawes reparations settlement. These results were predicted by Herbert Hoover, Secretary of Commerce, at a dinner held in New York City on Dec. 11 in honor of Owen D. Young, co-author and first administrator of the plan. This relief will apply not only to Germany, he said, but to the whole world.

The German reparations question had become one of the world's most dangerous inheritances from the war. The failure in its adjustment had poured an increasing stream of conflict into international life, carrying with it political jeopardy and economic demoralization. The wound to the present complex and intricate civilization was so deep and so vital that many had despaired lest statesmanship should be unequal to the task of curing the ills. Today there are many problems yet unsolved. None of them, however, is so dangerous as those that one by one have been met successfully in the six years since the armistice.

The payments provided in such settlements must find their substance from production and economic services rendered. These international obligations are huge burdens, but in the course of years burdens shrink as productivity grows. In a peaceful world international trade is doubled once in every score of years. It was contended that the world would break under the burdens of the Napoleonic wars, but about twenty years later they bore so lightly that their dangers were no longer discussed. The settlement to which Mr. Young contributed so much clears the atmosphere and the processes of industry and commerce will quickly provide strength to meet the burden, if the world keeps peace.

Manufacture and distribution on a vast scale, the foundation of present high standards of living, can be accomplished only through the development of great units of production, said Mr. Hoover. With their development have come innumerable problems of public relationship and public responsibility. A rapid evolution and perhaps a silent revolution are being witnessed to-day in the relationship of great business to the social system. The present struggle is to preserve the fundamental stimulus of action, of initiative, and competition, to hold open the avenues of opportunity. At the same time an effort is being made to gain the benefit of co-operative action. There is no greater responsibility than that imposed upon the headship of great industries, for from this leadership and vision must come not only great contributions to economic progress, but upon it depends the solution of the many social problems. Mr. Hoover said that Mr. Young has been the expression of this type of leadership.

The Dawes plan is strictly economic and has nothing military or political in it. This was emphasized by Mr. Young. He said the plan does not mean the completion of Europe's reconstruction. This is still in an initial stage. It begins to look, Mr. Young said, as if there were real hope of a new day in the world—a day in which human beings in all countries may live peacefully and develop and work and save. The plan could not have been created or adopted without America and it cannot succeed without the co-operation of the people of America. The agencies of American business must all co-operate in support of the plan. American men of commerce, industry, agriculture and finance must aid in the restoration of the credit and currencies of the principal commercial nations.

At one point in his speech, Mr. Young called for a definite foreign policy that would be free from "the

horseplay of domestic politics." He said that such a policy would advance the peace of the world. As an alternative he suggested putting the State Department in a non-partisan position so that all citizens, including senators, could speak and act on foreign policies, "free from thought of the charge of being traitor to the political party of their affiliation."

The dinner was arranged by a committee headed by A. C. Bedford, chairman of the Standard Oil Company of New Jersey. Mr. Young was congratulated by Secretary of Commerce Herbert Hoover, Richard F. Grant, president of the Chamber of Commerce of the United States, and by the Prime Ministers of Italy, Belgium, Great Britain and France. Mr. Young's achievements as ad interim Agent General of Reparations Payments were recognized by the French Republic, which invested him with the cross of a Commander of the Legion of Honor.

George W. Wickersham, formerly Attorney-General, presided at the dinner to Mr. Young. A telegram was received from President Coolidge in which he said:

> The commission's work is now recognized as a great contribution to re-established economic order in Europe and the distinguished part which Mr Young bore has earned for him the gratitude of people on both sides of the Atlantic.

Vice-President-elect Charles G. Dawes also sent his congratulations. Secretary of State Hughes telephoned his tribute from Washington. The remarks made by Mr. Hughes were relayed to the diners through a radio loud speaker.

# Newspaper Misapprehension Corrected

## Chicago Surface Lines Points Out Differences Between Chicago and Philadelphia Fares in an Effort to Correct False Impression Created by Editorial Comment

READERS of the Chicago *Journal* were advised in an editorial in the issue of Dec. 9 "to go back and walk around," a quoted passage from *Service Talks*, published by the Philadelphia Rapid Transit Company, "before they can be expected to grasp it." The passage was the one referred to in the ELECTRIC RAILWAY JOURNAL for Dec. 13 in which Mitten management and the 5-cent fare were discussed. The Chicago *Journal* suggested to its readers that "the spectacle of a street car management actually fighting for lower fares instead of high ones impresses the local straphangers as something fantastic—too good to be true." As the Chicago paper saw it, "Mr. Mitten was actuated by shrewd common sense as well as by regard for public convenience in taking the stand he did" on the 5-cent fare. Furthermore, the Chicago *Journal* said that the aid of the car crews in Philadelphia had been enlisted to such an extent "that Philadelphia got the street car habit more than any other city on earth."

G. A. Richardson, vice-president of the Chicago Surface Lines, felt that the editorial unintentionally gave a wrong impression and was extremely unfair to his company and to the riding public of Chicago. Mr. Richardson, who was vice-president of the Philadelphia Rapid Transit Company from 1919 to 1922, accordingly wrote to the editor to explain the situation. Mr. Richardson said in part:

> What Mr. Mitten wanted, to use his own words, was "a straight 5-cent fare with the elimination of all free transfers and 3-cent exchanges." You praise Mr. Mitten for this and apparently recommend it for Chicago.
>
> The Chicago Surface Lines carried passengers last year at an average rate per ride of 3.88 cents. On the basis of a straight 5-cent fare, such as Mr. Mitten suggested, each passenger would have had to pay 5 cents every time he boarded a car, no transfers being issued. The earnings of the Surface Lines from passenger service last year amounted to $56,987,000. With the straight 5-cent fare which Mr. Mitten advocated for Philadelphia and which your editorial indicates would be welcome here, our gross earnings from this source, on the basis of total rides, would have been more than $71,285,000, or $14,000,000 more than we received, and as no transfers would have been required, we would have saved the cost of printing and handling them, amounting to about $200,000.
>
> Your editorial also conveys the impression that the Philadelphia properties are paying enormous wages to their men, wages having increased 151 per cent. The Chicago Surface Lines pays its trainmen 75 cents an hour. At present the Philadelphia properties are paying 65 cents an hour, but a wage increase to 70 cents has been granted beginning Jan. 1, 1925, and in order to pay this wage increase Mr. Mitten applied for and secured from the Public Service Commission an increase in fare from 7 cents to 8, with tokens at 7½ cents.
>
> You assert that Mr. Mitten opposed this last increase from 7 cents to 8 cents. On the contrary Mr. Mitten applied for the increase. In a letter to the Mayor of Philadelphia, July 21, 1924, he said: "Our present urgent need must therefore be now met by increasing the 7-cent cash, four-tickets-for-25-cents fare. A fare of 8 cents cash, two tickets for 15 cents is now required." A temporary order for the increase was issued by the commission on his plea and it was hastened by his assertion of an immediate emergency.
>
> You also say that the riding per inhabitant in Philadelphia is more than in any other city on earth. There evidently has been some confusion in these figures. The issue of Mr. Mitten's *Service Talks* of Dec. 5, 1924, quotes a statement from the Boston News Bureau showing 381 rides per inhabitant in Philadelphia for last year. The same statement credits Chicago with 286 rides per inhabitant last year. The Chicago figure does not include the elevated system, which when combined with the Surface Lines brings the riding habit up to 356. The Philadelphia figure covering both elevated and surface lines includes 56,420,521 3-cent transfers and a number of zone fares, which are duplicate rides, and also some joint rate passengers. The true figure for Philadelphia on a comparable basis with Chicago should be 341 as compared with 356 in this city.
>
> With the recent fare increase to 8 cents and tokens two for 15 cents, effective Sept. 25, 1924, the average fare per ride in Philadelphia in October was 5.40 cents. The average fare per ride on the Chicago Surface Lines is 3.88 cents.
>
> It should be remembered that under the zone system in Philadelphia to ride, for instance, from the business district to Doylestown, a distance of less than 25 miles, a passenger must go through seven zones and pay a total of 38 cents. In Chicago on the surface lines it is possible to ride 35 miles for one fare of 7 cents.
>
> It should also be remembered that it is impossible to transfer from one surface line to another in the downtown district in Philadelphia without paying a 3-cent transfer charge, and that in no case is a second transfer given. If one wants to transfer twice, the second time he must pay a full fare.
>
> In Chicago a universal transfer system is in effect with practically unlimited transfers so long as the passenger is traveling in the same general direction.

## New York Transit Inquiry Under Way

Justice McAvoy on the morning of Dec. 15 opened the hearing on transit matters in New York authorized by Governor Smith as a result of charges of neglect lodged with him against the members of the Public Service Commission by Mayor Hylan. The first witness called was George McAneny, chairman of the commission. He was on the stand all the first day of the hearing.

The second day of the hearing the special counsel for the Mayor withdrew, as did also the corporation counsel and the other attorneys for the city. This they did as a protest against the ruling by Justice McAvoy that they would not be permitted to cross-examine witnesses or to conduct examination of witnesses in an effort to sustain the charges against the commissioners. Later counsel for Justice McAvoy explained that the proceeding was an inquiry and not a trial and he cited as precedent for the action the cases of the investigation of the insurance companies and other similar proceedings.

At the opening session serious charges were made against the Mayor by the commission through Mr. McAneny. These comprised a brief signed by the three transit commissioners which reviews transit history since 1913, and particularly since the creation of the commission. It brings twenty-six charges, all showing alleged neglect, obstruction or deceit on the part of Mayor Hylan. The charges are specific, even mathematical. They allege a constant and expensive blocking of construction by the Mayor—construction of subway lines and subway car facilities. The failure of the city to fulfill its contracts for new lines, storage yards and repair shops is alleged to have held up $35,000,000 worth of facilities. In referring to the operation of buses under the jurisdiction of the city administration the brief of the commission charged that in "instances large payments have been made by the private operators to persons possessing political influence, through whose intervention such permits for operation had been secured."

On Thursday Commissioner Leroy T. Harkness testified in connection with the reorganization of the Brooklyn Rapid Transit Company into the Brooklyn-Manhattan Transit Corporation. It was alleged that the commission failed to compel the B.-M. T. and the Interborough Rapid Transit companies, operators of the city-owned subways, to set aside a proper amount of money for depreciation as provided for by the dual contracts.

John H. Delaney, chairman of the city Board of Transportation and formerly Transit Construction Commissioner, was another witness on Thursday. He disputed the testimony of Mr. McAneny that the transit companies were prevented from giving better service because of a lack of yards and declared it was not necessary to furnish "bedrooms" for all the cars. He added that he never had taken this defense of lack of yard facilities very seriously.

## Strike on I. T. S. Settled

**0 Miles Interurban Tied Up Six Days—Closed Shop Accepted, but No Hourly Wage Increase**

Service was resumed on the lines of e Illinois Traction System, Peoria, Dec. 13 at 5 p. m., following a strike hich lasted six days. The men re-rned to work after a vote at which ey approved the action of the execu-re committee of the union in agree-g to a compromise of the issues. he strike affected about 400 miles of ilway. No effort was made by the mpany to operate trains.

The company maintained a con-liatory attitude throughout the entire roceeding. Business and civic organ-ations in several cities served by the mpany were unsuccessful in trying persuade the trainmen's organiza-n to submit the matter to arbitra-n. The company reiterated its wil-gness to settle on the basis of one the original three propositions or to bitrate the entire matter after the n had returned to work. These pro-sals were met with refusal in each se.

### Arbitration Provision Ignored

The committee representing the ainmen finally agreed to forego the mand for an increased wage. This t two points at issue—the closed op and the question of time and one-lf for overtime work. On the fifth y of the strike, a conference was ain arranged by the trainmen's com-ttee and officials of the Illinois Trac-n System, at which a tentative reement was drawn up which in-ded the provision that the trainmen op their demand for increased wage t the company recognize the prin-ple of the closed shop and agree to y 10 cents an hour in addition to the gular pay for overtime work, and at in the future, pending negotiation d execution of a new contract, train-en shall continue to work. This reement, in the nature of a compro-se on both sides, was referred back the membership of the trainmen's ganization for a referendum vote.

The strike followed action by the malgamated Association through its ecutive committee, issuing an order the 350 motormen, conductors and akemen employed to cease work at dnight on the morning of Dec. 7.

The contract under which the men d been working during the past year pired on Dec. 1. It provided for bitration. Negotiations for a new ntract began Nov. 26. The trainmen ked for an increase of 10 cents an ur in wages, a closed shop, time and e-half for overtime and a number of anges in the working conditions. The ge scale (in cents per hour) was as llows:

| | |
|---|---|
| otormen and conductors on freight runs | 65 |
| otormen and conductors on sleeper runs | 65 |
| ssenger motormen and conductors romoted prior to Jan. 1, 1923 | 62½ |
| ssenger motormen and conductors romoted after Jan. 1, 1923 | 60 |
| ainmen on branch lines | 55 to 60 |

A nine-hour day prevailed in the pas-nger service and a ten-hour day in e freight service.

During the negotiations the company took the stand that business conditions and the financial situation in which the company found itself would not permit of a contract that would add to the expense of operation. The company also insisted that the committee of five men representing the trainmen be authorized to negotiate a contract.

The committee representing the men reported on Dec. 5 that the members of the trainmen's organization had taken a vote in favor of quitting work, if necessary, to uphold the demands of a new contract with increased pay and better working conditions. At the same time the committee notified the company that the men were ready to consider any offer the company saw fit to make, if made before midnight, Dec. 7.

A reply from the company on the morning of Dec. 6 followed in the shape of three different propositions:

1.—That the committee of five should have authority from the rank and file of our men to negotiate a new agreement; that pending such negotiations an agreement should be made continuing the last contract (except as to wages) until a new agreement should be made; that the wages finally agreed to should be retroactive to Dec. 1, 1924.

2.—While this company in its efforts to continue railway service in its territory has urgent need for reduced expenses and believes a new contract should carry with it lower costs, we are willing to co-operate to the extent of agreeing to the renewal of the recently expired contract for a period of from three to six months. This was later extended by the company to a full year.

3.—Believing that our position is fair and one that will stand honest examination we proposed that the committee and the company enter into an agreement to submit the entire matter to arbitration as arranged for in our last contract.

The trainmen's committee advised the company at 4 p.m. on Dec. 6 that none of the three propositions was acceptable and that unless the company agreed to the original demand by 10:00 p.m. the men would quit work at midnight. This was virtually a six-hour strike notice, taken by the committee without submitting the three company propositions to the members of the trainmen's organization for a referendum vote.

## Track Changes Authorized in Mobile

Due to the fact that the Mobile Light & Railroad Company, Mobile, Ala., has been losing money for some time in railway operation, several changes in the trackage of its lines was allowed by the Alabama Public Service Commission at the meeting of that body held in Montgomery on Nov. 28.

The company was authorized to take up its track on the Wilkinson Street line and abandon service thereon. Permission was also granted to take up the tracks on old Government Street for a distance of three blocks. The commission's order also further provides that the company shall, in good faith, immediately take the necessary steps to operate cars over the Charleston-Beauregard and Cedar-Davis lines for the greater portion of the day on a 13-minute headway between cars.

The opinion of the commission was that when it was shown that a railway utility fails to earn a fair return on its investment, and such failure was not attributable to its fault, the utility should be allowed to make changes in its car tracks and rearrange and consolidate its service, if these changes would result in substantial reduction.

## Resolution Urges Agreement on Cincinnati Loop

Fearing that continuation of a deadlock on the traction situation would jeopardize the success of the rapid transit loop of Cincinnati, Ohio, the Rapid Transit Commission passed a resolution, presented by E. W. Edwards, chairman, urging an early agreement with the city, the Cincinnati Traction Company and the Cincinnati Street Railway. In presenting the resolution Mr. Edwards stated that the time had come when it was necessary to negotiate a contract for the operation of the loop, in which $6,000,000 of the taxpayers' money had been invested. A large section of the loop would likely be ready for operation during the latter part of 1925, it was asserted.

Mr. Edwards stated that the commission had been led to believe that the controversy would have been adjusted long before now, so that there would be no obstacle in the way of making a contract for the loop. He also called attention to the fact that the car riding public, on the basis of the present rate of fare, was called upon to pay approximately $2,500,000 annually. If the controversy were taken into the courts, as the Mayor had threatened to do, the people would be deprived of the service of the loop for several years.

## Baltimore Wage Increase Restores Peak of 1920

An increase of 2 per cent in the wages of its employees in operating departments was granted on Dec. 10 by the United Railways & Electric Company, Baltimore, Md. The increase, effective Jan. 1, will affect approximately 5,000 men.

The revised wage schedule briefly referred to in the ELECTRIC RAILWAY JOURNAL issue of Dec. 13, was announced at the annual meeting of company executives with representatives of the workers' organization, the United Railways Association of Baltimore. For platform men the increase will amount to about 1 cent an hour, making their minimum wage 47 cents an hour and the maximum 52 cents an hour, as compared with the present minimum of 46 cents and a maximum of 51 cents. The advance will add $155,000 to the company's annual payroll, officials said.

The wage question is but one feature of the working agreement under which the company and its employees operate, and the recent renewal of the agreement was the sixth since its inauguration.

An increase equivalent to the one just announced was granted last year. These increases restore wages to the peak point at which they stood in 1920, when 2 cents an hour was chopped off. They represent an increase of 18 cents since early in 1918, the last days of the 5-cent carfare.

## Madison Company Files Increased Fare Petition

An application for an increase in fares to become effective Jan. 1 was made to the Wisconsin Railroad Commission on Dec. 5 by the Madison Railways, Madison. This application followed a meeting of a committee of the commission and the company which was referred to in the ELECTRIC RAILWAY JOURNAL, issue of Dec. 6. The company asks for an average fare of 7 cents, although in previous meetings the plan of having an 8-cent cash fare with 17 tickets for $1 had been discussed.

The increase in fares is made necessary by the improvement plan which the company contemplates carrying out. In order to put through the present plan fully $700,000 is needed. Of this $700,000 it is estimated about $400,000 should be for replacement and $300,000 to capital account. Additional earnings of $80,000 are required for the completion of the program.

Part of the increase will be used to provide for an increase in the wages of the company's employees. It is planned to provide about $10,000 a year for this purpose. Several years ago the men accepted a wage cut of 3 cents an hour in order to keep the line in operation.

With an 8-cent cash fare and 17 tickets for $1 and taking into account the receipts of the company for last year, it was estimated that the additional revenues would range from $63,700 to $93,100, depending on the percentage of ticket sales. Last year the proportion of the gross receipts from cash fares was 60 per cent and that from tickets 40 per cent.

## Cleveland Men Reject Stanley Offer

Motormen and conductors employed by the Cleveland Railway, Cleveland, Ohio, at a secret ballot box referendum, Dec. 18, voted down a proposition offered them by John J. Stanley, president of the company, as a means of terminating all differences existing between the company and the union. His offer included the following terms:

1. The term of the contract between the company and the union to be definitely fixed at five years and to extend from May 1, 1925, to April 30, 1930.

2. In case arbitration of grievances is continued, the appeal for arbitration must be taken from the decision of the general manager. In case grievances are still left to the president or vice-president for decision, this is to be final and not subject to the determination of a board of arbitration.

3. The scale of wages to be: 60, 63 and 65 cents per hour, with differentials as at present, from Jan. 1, 1925, to April 30, 1926.

4. The past records of all employees to be cleared as of Jan. 1, 1925.

This offer means a wage increase of 5 cents an hour to the men and makes definite for a period of five years the closed shop contract now existing for an indefinite period. Officials of the union agreed to submit Mr. Stanley's proposition to the men without recommendation on their part.

The Common Pleas Court some time ago threw out the award of a board of arbitration that granted the men a 12-cent an hour increase dating back to May 1 of this year. An appeal from this decision is now pending in the Court of Appeals. If the men accept Mr. Stanley's new offer, it means that the court action likely will be terminated.

## Indicted Men in International Wreck to Stand Trial

Seven men who were indicted in January by the Niagara County grand jury in connection with the theft of dynamite alleged to have been used to destroy the Buffalo-Niagara Falls high-speed line of the International Railway at Ellwood Station on Aug. 14, 1922, will be placed on trial in Lockport on Dec. 22. Judge Charles Hickey of Niagara County has appointed Abner T. Hopkins as special attorney to prosecute the defendants, most of whom are former employees of the traction company.

Col. William J. Donovan, deputy attorney-general of the United States, who prosecuted the striking trainmen in the federal court at Buffalo, including former State Senator Robert Lacey, who pleaded guilty, will submit additional evidence in the dynamite case to the federal grand jury in Buffalo later this month. For more than a year Burns detectives and special agents of the United States Department of Justice have been investigating charges that high officials in the ranks of organized labor were responsible for the dynamiting. At least seven more indictments are rumored. Rewards totaling $100,000 are still offered by the International Railway for evidence in the case. Forty-two tourists were injured.

## Providence Men Explain Wage Attitude

Union employees of the United Electric Railways, Providence, R. I., have explained in a letter recently delivered to E. J. Dickson, vice-president of the railway, their attitude on the wage controversy, especially on the manner of arbitration. The contents of the letter were not made known. The contract with the men expired on Oct. 31. Prior to that date the employees submitted a draft of a new wage and working agreement which called for a general increase amounting to 14 cents an hour. The present scale is 56, 59 and 61 cents. In a letter answering the demands of the union the company stated that in order to advance wages 14 cents an hour it would be necessary to raise the fare to 13 cents cash and suggested an agreement based upon a reduction of the wages of the platform men of 5 cents an hour or a rate of 56 cents. Following the rejection of this offer by the men the company made it clear that if arbitration were resorted to the award "should be determined upon the evidence presented by the company of its ability to pay a reduced scale, the present scale or an increased scale and such determination should be based upon the resources of the company as of Nov. 1, 1924." The demands of the men were referred to in the ELECTRIC RAILWAY JOURNAL, issue of Oct. 18.

## News Notes

**Advance Plan for Westchester Co**
**struction.**—The Westchester Coun
Transit Commission has proposed
$150,000,000 plan for rapid transit co
struction providing through trai
from Westchester to lower Manhatta
The scheme would abandon the Gra
Central Terminal for suburban pa
senger service.

**May Electrify Line.**—The Pittsfie
Maysville branch of the Wabash Ra
road will not be operated by that ro
after Dec. 31, the date on which
present contract with the coun
expires. Engineers of the Centr
Illinois Public Service Compan
Springfield, Ill., have been inquiri
into the possible use of electricity.

**Teamed for Seventeen Years.**—*S*
*face Service*, the magazine of the C
cago Surface Lines, is promoting a co
test to determine what conductor a
motorman have teamed up togeth
longest. The contest began with
challenge from one pair who ha
worked together for 17 years. Th
are Conductor Charles Levighn,
years in the service, and Motorm
Maurice O'Connell, an employee sin
1881.

**Utility Courses at Oregon Universi**
—Another university to adopt the pl
of offering courses of study in pub
utilities is the University of Oregon
Eugene, Ore. This course is similar
those adopted by such Eastern univ
sities as Harvard, Pennsylvania, Nor
western, Illinois and others. T
courses are offered to provide mode
instructional work for men and wom
who are looking for careers in t
industrial world.

**Fare Hearing Continued.** — T
application of the Oklahoma Railwa
Oklahoma City, Okla., for a 10-ce
fare, set for Dec. 6, was deferred
Dec. 8 over the objection of the co
pany. On Dec. 8 Mayor Cargill d
clared the city would encourage bus
on all streets occupied by the compa
if the increase were granted. The co
mission continued the hearing to Ja
16. John W. Shartel, president of t
company, then declared justice delay
is justice denied and said the bon
holders must protect themselves. Ea
action is, therefore, expected in t
federal receivership case which is n
pending.

**Turnstiles in Use.**—Two automa
turnstiles were put into operation
the Sixty-ninth Street Terminal of t
Philadelphia Rapid Transit Compan
Philadelphia, Pa., on Dec. 14 in ord
to determine the adaptability of th
type of equipment to the Market Stre
subway-elevated system. Two differe
types of turnstiles are used. They c
be operated by inserting a 7½-cent tok
and their use is expected to speed
the service materially by expediti
the handling of passengers at th
location. General use of the new ca
fare carriers by elevated passenger
eliminating the necessity of freque
change-making, will work still furth
to the advantage of the company
patrons because of this new develo

One turnstile resembles the turn- used by the Interborough Rapid sit Company and the other that e in the Brooklyn-Manhattan Tran- orporation's stations.

**ks Amendment of Paving Obliga-** —Anticipating renewed efforts at oming session of the New Jersey lature to procure enactment of a elieving street railways from the ation to pave parts of streets in they operate, Secretary Sedley hinney of the State League of cipalities has sent a communica- o the New Jersey Board of Public y Commissioners asking that to present to the Legislature a te recommendation for modifica- f paving obligations. Mr. Phinney that municipalities would be sub- al sufferers if such a measure as sed at the last session were to be- a law.

**e-Man Cars for Night Service.**— nan cars are planned by the Third ne Railway, New York, for its service on its lines in Manhattan he Bronx. The extent of the serv- th this type of equipment remains determined.

**nts One-Man Car Service.**—The Valley Traction Company, Boise, , has petitioned the Public Utili- Commission for permission to in- one-man cars on the South Boise R. B. King, general manager of ailway, stated that unless such my could be made, which would in large savings in the cost of tion, the Boise Valley Traction any would be forced to suspend ess. He said further that on the Boise line in 1920 there was a of $4,255, in 1921 the deficit was , in 1922 it was $2,850 and in 1923 $4,589. For the first four months current year the line was running d $1,088.

**ly Morning and Owl Services.**— Grand Rapids Railway, Grand s, Mich., has started an early ng service for the accommodation tory workers. The service starts 45 a.m. and is so routed as to men who formerly had to walk rk to go by street car. The serv- s been started on one route as periment. The plan will be ex- d to other lines as its success be- apparent. It is also planned to ablish owl service.

**linance Proposes Bus Lines.** — an ordinance recently introduced e City Council the Jacksonville ion Company will be authorized erate bus lines through the River- ection, a portion of Jacksonville, not being served by street cars. roposed line in this new territory e between 4 and 5 miles in length erved by six buses charging a nt fare. If the ordinance is ed the company will purchase y safety type buses.

**ing Dispute Terminated.**—The controversy between the United ion Company and the city of y as to the cost of the pavement Western Avenue, on which the d Traction Company operates over ivately owned right-of-way, has settled, it was announced by r William S. Hackett of Albany on Nov. 19. The city of Albany will enter into an agreement with the United Traction Company whereby the latter will be granted a franchise extending over a period of years for the operation of trackless trolleys on Western Avenue, Allen Street, across Central Avenue and over Watervliet Avenue in return for feeing to the city the 33-ft. right-of-way in Western Avenue. Paving the deeded right-of-way will be started next spring, Mayor Hackett announced.

**New Bus Lines Opened.**—The Central Transportation Company, a subsidiary of the Trenton & Mercer County Transportation Company, Trenton, N. J., has opened up three new bus lines. One is running to Princeton and Kingston, a distance of 14 miles; another to Trenton Junction, 4 miles, and the third along the White Horse Road, 5 miles. The company has placed a luxurious motor coach in service between Trenton and Asbury Park.

**"Service" as You Ride**—Every two weeks, on Saturday morning, the Indiana Service Company, Fort Wayne, Ind., places in its street cars and distributes to its employees a folder known as "Service." In the premier issue of this paper, under date of Sept. 27, the company announced that it was dedicated "To Your Daily Journey, which we are trying to make safer and more comfortable." The folder is a four-page sheet of convenient size containing some valuable information on city and interurban service and offering a few jokes as entertainment for its readers while they ride. The pamphlet invites criticisms along suggestive lines to bring about a better understanding between the company and its patrons.

**Want Employees Protected.**—Protection of employees of the Kansas City Railways, Kansas City, Mo., will be sought in the offering of $200 rewards by the receivers for conviction and arrest of reckless drivers. As it stands now, $200 will be paid for arrest and conviction of drivers of motor cars who injure or kill patrons of the railways while they are about to board, are leaving cars or are assembled in safety zones waiting for street cars.

**Higher Bus Fees Proposed.**—Higher license fees for buses and jitneys are proposed in an ordinance just introduced in the Indianapolis, Ind., City Council in which the maximum charge would be increased from $100 to $250 annually. The ordinance provides that bus companies should not be required to file a bond with the city, but provide insurance policies of $10,000 to $20,000, depending on the size of the bus.

**Electric Line Will Supplant Steam Railroad.**—The Chicago, Burlington & Quincy Railroad has asked the State Public Utilities Commission for permission to discontinue the operation of passenger trains between LaFayette and Denver. Instead it will operate two trains daily between Louisville and Lyons and then transfer passengers for Denver and intermediate points to the "Kite" Route, the electric railway operating between Denver and Boulder via Louisville. LaFayette is an intermediate point on the steam railroad Denver to Lyons. The suggested change would give the citizens two trains daily between Lyons and Denver, instead of one. The Chicago, Burlington & Quincy Railroad has been operating for years between Denver and Lyons, Colo.

**Gives Up Claims Following Payment.**—The municipality of Peoria, Ill., has accepted $17,000 in settlement of its paving assessment claims against the defunct Aurora, Plainfield & Joilet Electric line and bondholders' representatives relinquish all claims to the tangible assets within the city's limits. This portion of the plant is to be removed by the city, and it is expected this will settle the involved financial affairs of the defunct traction line. The city has had negotiations with the Northwest Utilities Company of Montana to operate cars over the line, but these were fruitless. Bus lines are expected to be authorized to supplant the suspended lines.

**Considering Bus Lines.**—The Wisconsin Public Service Corporation, Green Bay, Wis., has under consideration plans for the establishment of bus and motor truck rapid transit lines to radiate out of Green Bay to reach each of the principal cities and villages in northeastern Wisconsin. If carried out, the plan will require an initial investment of between $200,000 and $300,000 for rolling stock, depots and other equipment for this business. Complete data are being collected and examined by the company's transportation experts.

**Bus from Lansing to St. Johns.**—A permit has been granted the Michigan Electric Railway, Jackson, Mich., to operate a bus line from Lansing to St. Johns over a new paved road connecting the two cities. Application from Wilfred J. Richards to operate a bus line from Lansing to Jackson was refused on the showing of the railway, which contended that its present interurban service between the two points is sufficient to care for the traffic. The railway also sought a bus permit. It contended that if a permit was granted it should receive preference and be allowed to run the buses in connection with its interurbans. The commission decided that traffic was adequately provided for by the railway.

**Side Signs in Knoxville.**—All cars of the Knoxville Power & Light Company, Knoxville, Tenn., will in the near future be equipped with signs on the sides as well as the front and rear in deference to public requests.

**Must Submit One-Man Car Data.**—The Public Service Commission, under an order adopted at a session in New York Dec. 15 and served upon the International Railway, Buffalo, will give a hearing at the Buffalo office of the commission on Dec. 29 in the matter of one-man car operation in the city of Buffalo. The commission's order directs the company to submit testimony covering regulations, practices and equipment in respect to the operation of one-man cars; the lines operated as one-man car lines in the city of Buffalo; the number of cars operated and the headway maintained on each line; the number of passengers carried; the number of accidents which have occurred since Jan. 1, 1924, and the cause or causes of such accidents.

# Financial and Corporate

## New Reorganization Plan

**$296,000 Will Be Provided Under the Revised Scheme for Massachusetts Interurban**

A new plan, dated July 16, 1924, has been prepared and is being forwarded to security holders of the Boston & Worcester Street Railway and the holding company, the Boston & Worcester Electric Companies. More than 90 per cent of the first mortgage 4½ per cent bonds of the Boston & Worcester Street Railway due Aug. 1, 1923, were deposited under the plan of reorganization formulated when they matured, but it was felt that the bondholders did not make the required response.

In brief, the new plan provides for the exchange of $2,460,000 first 4½s, 1923, and $60,000 Framingham, Southborough & Marlborough Street Railway extended 7s, 1923, for new first mortgage 20-year bonds dated Aug. 1, 1924. Bondholders who subscribe $140 a bond for 10 shares of additional common stock will receive 6 per cent bonds in exchange for their present holdings, non-subscribing bondholders will receive 5 per cent bonds. This subscription right will be subject to the subscription privilege offered preferred shareholders of the Electric companies of subscribing for one share of railway common at $14 for each two shares of Electric companies preferred held. By these subscriptions $296,940 cash will be provided for improvements.

In addition to subscribing for common stock for cash the Electric companies will exchange $47,000 of notes and $60,000 of preferred stock of the railway for common stock of the latter par for par. The banks which hold $115,000 notes of the railway will accept 10-year 6 per cent income bonds. Preferred shareholders of the railway will waive accumulated dividends and exchange their stock for a new issue of 6 per cent preferred stock which will become cumulative upon retirement of the income debentures. Bondholders will receive accrued and unpaid interest on their bonds at 4½ per cent to Aug. 1, 1924.

It is said that upon completion of a study of operating conditions of the property now in progress it is possible that one or more branches may be abandoned, or buses substituted.

## Portland, Ore., Will Sell Car Line

The city of Portland, Ore., has announced that on Jan. 15 City Treasurer Adams will sell to the highest bidder the Kings Heights car line, for delinquent assessments and taxes, amounting to $11,669, dating from Dec. 6, 1913. The line is operated by the Portland Electric Power Company as an accommodation to the people of the district, without franchise or title to the property, and is declared to be daily losing money. It is doubtful if the company will want to put in a bid.

The car line was built shortly after the city granted the franchise to the Heights Trust Company on July 28, 1910, to operate until Dec. 31, 1932. The franchise provided that connections be made with the lines of the Portland Electric Power Company and transfers be made over both lines. The Heights line is to pay the city $500 a year as a franchise fee, and the estimated cost of construction of the line at the time of granting the franchise was $20,000. The Heights Trust Company met financial reverses and the Portland Electric Power Comp finally took over the operation of line because many of its patrons other lines lived on Kings Heights.

## Two Chicago Appraisal Engineers Selected

Major R. F. Kelker, Jr., Chicago, expert in the service of many big ci and formerly in the employ of city of Chicago, and William Hagenah, Chicago, another engi well known nationally, have been lected as two of the engineers to m a valuation of the surface lines th Major Kelker was selected by the and Mr. Hagenah by the bankers ing for the owners. They will joi select the third member of the bo

# Eight-Cent Fare at Denver Upheld by U. S. District Court

**Valuation $23,514,769 for Rate Making—Additional Value of $2,000,0 for Perpetual Easements in Streets Excluded from Rate Base—Court Holds "Ordinarily, Reproduction Cost New Less Depreciation Is the Dominant Factor in a Present-Valuation Inquiry"**

JUDGE ROBERT E. LEWIS of the District Court of the United States for the District of Colorado on Dec. 13, 1924, handed down a decision in the Denver Tramway valuation and rate of fare case. He fixed the value of the property for rate-making purposes at $23,514,769 and made permanent the present 8-cent cash fare (with 7½-cent ticket fare) and approved the 7½ per cent rate of return allowed by the special master in chancery.

This is the first large street railway to conduct a confiscation case originating in the United States court that necessitated the presentation *de novo* to the court of all details of invent and valuation with detailed testim as to the principles of valuat adopted with respect to the basis reproduction costs, depreciation and cost of development as measuring going concern value of electric railw properties. Usually the valuations fixed by the Public Service Commiss and reach the federal court only appeal.

The decision disposes of four portant items of controversy betw the municipalities and the street r way companies and gives judicial in pretation to points that have b

COMPARATIVE VALUATIONS OF DENVER TRAMWAY

Valuation as fixed by decision of United States District Court compared with A. L. Drum & Co valuation as of Dec. 31, 1922, based on unit prices as of Dec. 31, 1922, after deducting items specifi excluded by master and with D. F. Wilcox valuation based on normal reproduction cost for the city of Den

| | D. F. Wilcox, Normal Reproduction Cost | A. L. Drum & Company, Dec. 31, 1922, Valuation, Less Items Excluded by Master | Decision of District Court |
|---|---|---|---|
| Land and right-of-way (exclusive of water rights) | $428,016 | $1,107,024 | $ 972,2 |
| Track | 2,908,544 | 5,347,255 | 5,121,7 |
| Bridges | 478,268 | 856,231 | 800,0 |
| Paving | 725,632 | 1,412,005 | 1,342,7 |
| Electrical distribution system | 776,691 | 1,075,769 | 1,004,4 |
| Rolling stock | 2,365,644 | 4,445,233 | 4,198,5 |
| Power station equipment | 746,504 | 1,598,098 | 1,504,9 |
| Substation equipment | 184,015 | 256,138 | 242,0 |
| Shop equipment, tools, etc | 265,107 | 391,514 | 391,5 |
| Buildings | 1,520,361 | 2,510,803 | 2,357,9 |
| Furniture and fixtures | 82,584 | 174,716 | 144,0 |
| Total inventoried property | $10,479,356 | $19,174,786 | $18,467,2 |
| General stores | | 507,599 | 507,5 |
| Working capital | | 239,394 | 239,3 |
| Cost of franchise | | 284,100 | 100,0 |
| Engineering and superintendence | 355,605 | 998,325 | 970,0 |
| Administration, organization and legal expense | 818,569 | 953,010 | 839,7 |
| Taxes | 54,175 | 325,220 | 323,2 |
| Interest | 343,554 | 2,669,165 | 1,664,8 |
| Total physical property | $12,051,259 | $25,151,599 | $22,814,6 |
| Accrued depreciation deducted | 4,836,031 | 2,436,915 | 2,250,0 |
| Physical property less depreciation | $7,215,228 | $22,714,684 | $20,564,6 |
| Intangibles: | | | |
| Cost of financing | | 1,301,455 | |
| Water rights | | 290,622 | 49,9 |
| Going value | | 4,000,000 | 2,900,0 |
| Total value for rate making | $7,215,228 | $28,306,761 | $23,514,7 |
| Value of right-of-way on streets under perpetual easement | | $2,000,000 | $2,000,0 |

upon by the representatives of ipalities in order to depreciate ower the values of traction prop-

decision clearly establishes:

hat great weight should be given to uction cost at present-day prices.
hat a fair allowance for general over- should be made.
hat accrued depreciation should be ed only to the extent actually found g in the physical property, by the ion of the property.
hat a definite going value exists in a railway property and must be in- for rate-making purposes.

decision on these four important is especially clear. The court

narily, reproduction cost new less iation is the dominant factor in a t-valuation inquiry. S. W. Bell Co. vs. Pub. Serv. Comm., 262 U. S., Bluefield Co. vs. Pub. Serv. Comm., S., 679; Monroe Gas Light & Fuel Mich. Pub. Util. Comm., 292 Fed., Van Wert Gas Light Co. vs. Pub. Comm., 299 Fed., 670.
ued depreciation is a fact to be as- ed by inspection.
e remains to be added an amount oing concern value. . . . I am of the notion that each of these es knew much more than I do about it would probably cost to put a n street railway plant in successful ion. I am sure they each knew a deal and I see no escape from ac- the lowest amount named in the ony, $2,900,000, which, added, brings luation of the plant to $23,514,769.

WANCE FOR PERPETUAL EASEMENT

court allowed additional value of ,000 for perpetual easements or of-way in the streets under the r franchises of 1885 and 1888 as property value. It stated:

one doubts that the easements, what- heir duration or terms may be, are ty, and property of value, and that inhere in and are indispensable to her property rights of the company. lie in grants and are the foundation other rights. They are of such both to the company and the public, aving been put in issue, I think their on and value should be now adjudi- though it be finally held, as the r held, that their value cannot be t into the rate base. . . .
terms used in both ordinances, 1885 888, are appropriate to grants in per- . There are no express limitations o language is used from which an ation can arise that a less estate ntended than the general terms sig- The nature of the transaction, its es, its permanent character, and the ment required of the grantees repel tention by either grantor or grantee hey were revocable licenses or ease- at the will of the grantor, nor can xpression be found in either ordinance rting a claim that the rights granted o be for a term of years.

is comment has been interpreted an that in the event of condemna- for purchase of the property the any would be entitled to an allow- of $2,000,000 for the perpetual ents on the streets of Denver. court, however, excluded this nt from the value for rate-making

e court sets forth at length in the ion the respective qualifications practical experiences of Delos F. x, appraiser for the city of Den- and A. L. Drum, valuation engi- for the Denver Tramway, stating llows:

hink it clear beyond question that was a total failure to qualify this s (Delos F. Wilcox) as an expert hat it was error in matter of law to t him to testify as an expert.

tabulation published herewith by classified items a comparison e values of the property as found e court, A. L. Drum, representing the Denver Tramway, and Delos F. Wilcox, representing the city of Denver.

It will be recalled that Judge Dubbs as special master fixed the value of the property at $20,105,707. His findings in the case were reviewed at length in the issue of the ELECTRIC RAILWAY JOURNAL for Sept. 13, page 406. In his review of the case the special master said that the burden of proof was on the company.

## Ohio Traction Company Stock Active

A rise of ten points in the preferred stock of the Ohio Traction Company, Cincinnati, Ohio, has taken place during the last three weeks. This activity is attributed to heavy purchases by Eastern capitalists. The Ohio Traction Company owns and controls the stock of the Cincinnati Traction Company, which operates the system under lease from the Cincinnati Street Railway. The company pays a dividend of 5 per cent. The heavy buying of the stock is attributed to the fact that the Ohio Traction Company has wiped out its indebtedness and now is in a position to resume the payment of dividends, which were discontinued in November, 1915. At that time the preferred was quoted at 55 on the Cincinnati Stock Exchange. Such well known New York brokerage firms as W. H. Harriman & Company have been buyers.

It was stated that if the traction interests and the city of Cincinnati were unable to reach an agreement over a new franchise, the Ohio Traction Company was willing to pay back franchise taxes from the time it started to raise fares above the level of 7½ cents. This would amount to $437,500, which would include the year of 1924 and the last quarter of 1923. In the event that the city is unable to effect an agreement with the traction interests before the advent of 1925 it is possible that the traction company will make a proposition to the city which will embody the payment of the back franchise tax and the keeping of fares at their present level, 10 cents. On the other hand, should the city take the matter into the courts this would involve long litigation, permitting the traction company to control the system for an indefinite period. At the present rate of fare the traction company would accumulate a surplus in the course of time, which would react to the benefit of the car rider.

## New Personnel for Oklahoma Property

Officers of Albert Emanuel & Company, New York, N. Y., have been elected to the Pittsburg County Railway, McAlester, Okla., following the purchase some time ago of that property by the Emanuel interests. At the same time that the railway was taken over the Emanuel people took over the Choctaw Power & Light Company. These two properties are now included in the holdings of the Southwestern Power Company, which operates in the Oklahoma district. The new officers are as follows: President, Albert Emanuel; vice-president, Victor Emanuel; vice-president, general manager and head of purchasing department, G. W. Skow; secretary, Floyd H. Harper; treasurer, C. B. Zeigler; assistant treasurer, F. R. Merris; superintendent of railway, J. M. Putnam; district superintendent, H. B. Harris; chief engineer, H. T. Asbury; head of traffic department, A. R. Goodner, and chief engineer of the power plant, M. P. York.

The new owners of the property have proceeded with the work of rehabilitating the Pittsburg County Railway and have carried out important replacements and reconstruction. The road is in a territory that affords considerable freight and is said to be doing very well from the standpoint of the freight earnings. The line is 26 miles long.

## Chicago Probably Leads Country in Riders per Capita

Detailed figures on car riding habit in the leading cities of the United States compiled by the Chicago Surface Lines place New York, Chicago and Philadelphia in the lead in that order on a basis of actual passengers carried. An explanation states that a division of the New York revenue passenger figures, if available, would reveal that many of the fares paid represent a duplication of the same person changing from one line to another where there is no transfer privilege.

The figures stand as follows:

| No. of Rides per Capita Daily: | |
|---|---|
| New York | 1.21 |
| Chicago | 1.03 |
| Philadelphia | 0.89 |

The Chicago figure is based on the United States census population of 2,936,605 and the following monthly revenue passengers:

| | |
|---|---|
| Surface lines | 70,543,501 |
| Elevated | 18,154,400 |
| Motor coach | 5,029,875 |
| Total | 93,727,776 |
| Daily average revenue rides... | 3,023,476 |
| Excess of rides per day over population | 83,871 |

For New York, the revenue rides of the last calendar year, 2,623,793,713, were divided into a daily average of 7,188,475 as against a population of 5,927,625, showing an excess of rides over population of 1,260,850.

In Philadelphia the revenue rides, exclusive of 3-cent transfers, zone fares and joint rate passengers, was placed at 53,870,920 for October, a daily average of 1,737,771. The population, 1,951,076, used as a divisor, shows 0.89 of a ride per day per capita, or 213,305 fewer rides daily than population. In these figures, 160,000 population outside the city was included. The number of passengers was arrived at by subtracting 56,420,521 3-cent transfers. By counting in 3-cent transfers as separate revenue passengers, Philadelphia is placed in the lead in the "riding habit."

The figures were based on research directed by J. V. Sullivan, assistant to the vice-president of the Chicago Surface Lines. They are sponsored by Guy A. Richardson, vice-president and general manager of the Chicago Surface Lines.

## $2,700,000 of P.R.T. Equipment Trust Certificates Offered

Dillon, Read & Company, New York, offered for subscription on Dec. 16 $2,700,000 of 5½ per cent equipment trust certificates of the Philadelphia Rapid Transit Company. The certificates mature serially from 1925 to 1934 and were priced to yield approximately 4.75 per cent to 5.50 per cent according to maturity.

The bankers explain that the certificates are to be issued by the trustee in part payment for new equipment consisting of 100 standard double-truck vestibuled cars, 125 double-deck motor coaches, 77 single-deck motor coaches and 11 motorized service units. This equipment will be constructed at a total cost of not less than $3,772,000. The par value of the certificates represent approximately 75 per cent of the cash cost of the railway cars and less than 70 per cent of the cash cost of the motor vehicles.

## Raleigh Company Reorganized

The Carolina Power & Light Company, Raleigh, N. C., recently acquired by the J. G. White Company, has been reorganized. The following officers were elected: P. F. Henderson, president; W. W. Muckenfuss, secretary; M. H. Hendee, treasurer, and Harry Sudlow, manager. The board of directors is composed of P. F. Henderson, W. W. Muckenfuss and Charles J. Hill of Aiken, and George T. Jackson and F. B. Culley of North Augusta.

## Toronto Purchase Price Finally Settled

Final settlement has been reached between the city of Toronto and the Toronto Street Railway regarding the purchase of the latter's properties by the municipality. The cost to the city is $13,679,242. The award of arbitrators, as finally settled by the Privy Council, was $11,483,500. Interest on this is $1,550,000 and legal charges $700,000.

## $7,000,000 North Shore Issue Offered for Subscription

First and refunding mortgage bonds of the Chicago, North Shore & Milwaukee Railroad, Highwood, Ill., to the amount of $7,000,000 were offered for public subscription on the morning of Dec. 19. The offering syndicate was headed by Halsey Stuart & Company, Inc., and the National City Company, New York. The bonds are dated Jan. 2, 1925, and are due Jan. 1, 1955. They carry 6 per cent interest and were offered at 98 and interest to yield 6.15 per cent. The present issue is known as series A. It is explained that the proceeds from the sale of the bonds will be used to refund $3,500,000 of one-year notes due June 15, 1925, issued in connection with the construction of the first section of the road to Waukegan, for the retirement of $2,721,700 additional principal amount of the company's refunded obligations, and for other corporate purposes. In the letter of the railway to the bankers giving the facts with respect to the purchase of the bonds by them the point is emphasized that the railway won the Coffin prize in 1923 awarded for its distinguished contribution to the electric railway industry. The bankers, in turn, call the attention of the investing public to this fact.

**Auction Sales in New York.**—At the public auction rooms of A. H. Muller & Sons there were sold this week 100 shares of Helena Light & Railway Company, Helena, Mont., preferred, $10 per share, and 20 shares of preferred, $15 a share. Also 250 shares Third Avenue Railroad, New York, $14 a share.

**Approves Issue for Refinancing.**—The Public Utilities Commission has approved the application of the Washington Railway & Electric Company, Washington, D. C., to issue $1,850,000 of its general and refunding mortgage 6 per cent 10-year gold bonds made a short time ago. The issue is for the purpose of refinancing the utility's obligations, specifically a loan of $1,850,000 of Metropolitan Railroad Company first mortgage 5s which mature on Feb. 1.

**Bonds Offered.**—A syndicate including E. H. Rollins & Sons is offering at 97 and accrued interest to yield more than 5.70 per cent $5,000,000 of the first and refunding mortgage 5½ per cent gold bonds of the Illinois Power & Light Corporation, Chicago, Ill. The bonds, known as series "B," are dated Dec. 1, 1924, and are due Dec. 1, 1954. The proceeds will be used to reimburse the treasury in part for expenditures on account of additions, extensions and improvements which have been made or are to be made to the properties and for the retirement of $157,500 underlying bonds.

**Debenture Bonds Offered.**—Bodell & Company, Providence, R. I., are offering at 91 and interest, yielding 6.70 per cent, $2,500,000 of the 30-year debenture gold bonds of the Federal Light & Traction Company, New York, N. Y. The bonds, known as Series "B," are dated Dec. 1, 1924, and are due Dec. 1, 1954. The proceeds of these debenture bonds will be used to retire any outstanding unconverted series "A" 7 per cent debentures which will be called for payment on March 1, 1925, and for extensions and improvements made or to be made to the properties of the operated companies.

**Urged to Deposit Bonds.**—The committee for the holders of first mortgage 6 per cent 10-year gold bonds of the Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan., has announced that the time for the deposit of the bonds expires Jan. 10 next. The bonds became due Aug. 1, 1924. There is now on deposit a majority of the bonds.

**Asks Revaluation.**—When the petition for an increase in rates on the line of the Richmond & Petersburg Interurban Railway came up before the State Corporation Commission, on Dec. 3, counsel for the citizens who are opposing the Virginia Railway & Power Company's application insisted on a revaluation of the interurban line. The commission heard the motion to revalue the property and gave both parties ten days in which to file briefs. The present fare from Richmond Petersburg is 47 cents and the f sought is 60 cents.

**Shareholders Made Offer.**—A c mittee has been formed for the purp of arranging a sale of the prefe and common shares of the New Ha shire Electric Railways, Haver Mass., and has received an offer of per share for the preferred shares $3 per share for the common shares. offer has been accepted by the own of upward of 50 per cent of each c of shares and the committee rec mends the acceptance of the offer by shareholders. The shareholders de ous of accepting the offer must dep their shares on or before Jan. 5, 1

**May Abandon Cars.**—Manager H ding of the Columbus Electric & Po Company, Columbus, Ga., submitte statement at a recent meeting of directors of the Chamber of Comme and asked for a public hearing on plan to abandon the railway line wh runs through Wynnton as far as W wood Park. His idea calls for the s stitution of a bus route under management of the Columbus Tra portation Company. He believes this operation will be more economi than extending existing railway lin

**Cars Cease to Operate in Ol City.**—The St. John's Electric Comp has abandoned service in the city St. Augustine, Fla., but will conti to operate the line to Anastasia, company planning to commence on work of rebuilding its line to Augustine Beach within a short t The company has been operating loss for some time now, but an ag ment could not be reached until company said it would rebuild the to the beach and assume certain o gations with regard to street impr ments. The ordinance was publis about a month ago and no restrain order being filed the company be the work of dismantling.

**Gross and Net Earnings Decrease** The revenue of the Barcelona Tract Light & Power Company, Barcel Spain, for the year ended Dec. 31, 1 was $2,726,973, according to the n annual report recently submitted to board of directors. The administra and general expenses were $154, There was a balance of revenue av able for interest on first mortg bonds of $1,123,511. The bala carried to the balance sheet for year was $21,985. In the report the shareholders E. R. Peacock, pr dent, said that the operating result the tramway showed a decrease gross earnings of 1.3 per cent and net earnings of 7.8 per cent compa with the previous year.

**Property Sold.**—The Sheffield C pany sold its electric railway at Sheff Ala., on Dec. 8 to the Alabama Po Company. The consideration was announced, but was said to be ab $3,000,000. The property will be ta over by the Alabama Power Comp directly. The Sheffield Company ow and operated the interurban railw which served Sheffield, Florence Tuscumbia. It also owned the po plant which distributes light and pow and the water plant which supp Sheffield and Tuscumbia.

# Personal Items

## Mr. Langan Advanced in Westinghouse Service

T. R. Langan, recently appointed anager of the transportation division the New York office of the Westing- use Electric & Manufacturing Com- ny, formerly was manager of the ansportation section in the Buffalo ew York) district with headquarters Syracuse. In New York Mr. ngan succeeds A. J. Manson, recently omoted to the position of manager the heavy traction division of the ilway sales department at East ttsburgh.

After taking courses at Pratt In- itute, Brooklyn, and while taking ght courses at Carnegie Institute of chnology, Pittsburgh, Mr. Langan tered the employ of the Westing- use Company in 1904 as an armature nder's helper and wireman's helper the service department. His work om 1904 to 1906 was in connection ith the earlier installation of mul- ple-unit control equipments on the ooklyn Elevated and New York sub- ay. In 1906 he began the special ap- enticeship course at the East Pitts- rgh Works.

In 1908 Mr. Langan took up con- ruction work in the service depart- ent. Later in that same year he was ade assistant general foreman of aintenance on the electric division of e New York, New Haven & Hartford ilroad with headquarters at Stam- rd, Conn. In 1910 he was back again East Pittsburgh on special service d engineering work in connection ith the development of the present e of Westinghouse HL control and ilway apparatus.

Mr. Langan entered the sales depart- ent in 1913 and began his selling reer at Baltimore. He won success d recognition at once. From Balti- ore he went to Philadelphia, then to ffalo and later to Syracuse. His esent move to New York places Mr. ngan in charge of the largest dis- ict office transportation division of e Westinghouse Company.

## F. C. Pratt a Vice-President of General Electric

Francis C. Pratt, vice-president in arge of engineering of the General lectric Company, has been appointed fill the vacancy caused by the res- nation of G. E. Emmons as vice- esident in charge of manufacturing d chairman of the manufacturing mmittee. Mr. Pratt's new title will vice-president in charge of engi- eering and manufacturing.

In 1890 Mr. Pratt entered the plant the Pratt & Whitney Company at artford, of which concern his father as president. He advanced to the ce-presidency and, in 1906, left to be- me associated with the General Elec- ic Company as assistant to E. W. ice, Jr. In 1912 he was appointed ssistant to the president and in 1919 was elevated to the vice-presidency in charge of engineering. He was born in Hartford, Conn., Jan. 19, 1867. He was graduated with the degree of Ph.B. from the Sheffield Scientific School, Yale University, in 1888.

## J. E. Hutcheson Honored

### Montreal Tramways Manager Receives Recognition for Long and Able Service

Lieut.-Col. J. E. Hutcheson, recently elected vice-president of the Montreal Tramways, Montreal, Que., in addition to general manager, has been connected with that property since 1912. The new honors that thus have come to him are well merited. Colonel Hutcheson is a man of unusual ability and he has made a remarkable record in his han-



J. E. Hutcheson

dling of the operation of the tramway company. There have been several changes in the financial control of the tramway during the colonel's term of service with the property, but there has never been any question about his outstanding fitness for the post of manager, and now acknowledgment of his attainments in handling the property has come in his recent advancement to the vice-presidency of the company.

Not the least of the achievements during his service as manager was the adoption of the service-at-cost plan. Some day, no doubt, the history of the negotiation of that agreement will be fully set forth, and it is unthinkable that Colonel Hutcheson's name will not be found written large in that work for the direct and indirect part which he took in helping to accomplish the passage of this measure. The terms of this contract are administered by a commission of three members, with whom the colonel has worked in close contact and with harmony. A measure of the success of the company under Colonel Hutcheson's direction is fortunately furnished by a recent offering of bonds of the company on a 5.45 per cent basis, in which it is divulged that the net earnings are more than 3½ times the annual bond interest charges. The colonel has also been in demand on numerous occasions to act in an advisory capacity in connection with the determination of railway and utility problems elsewhere.

Colonel Hutcheson entered the steam railway field in 1878 as a telegraph operator on the Grand Trunk Railway. In 1884 he joined the Canadian Pacific Railway as train dispatcher, and later became trainmaster and divisional superintendent. He left the service of the Canadian Pacific Railway in 1891 to take charge of the construction and later the management of the Ottawa Electric Railway. He remained in the service of that company until August, 1912, when he resigned to go to Montreal as general manager of the Montreal Tramways.

The colonel has had many years of service in the Canadian Militia, and for several years prior and during the great war served as a member of the committee on small arm development and manufacture in the Department of Militia and Defense. Despite his responsibilities he has not forgotten how to play. He is still very much the boy. He has always taken keen interest in military rifle shooting and was one of the leading rifle shots of the Dominion. He was a member of the Canadian Rifle Team which was sent to compete at Bisley, England, on several occasions and was adjutant and coach of the Canadian team in 1910. He was also a captain and coach of the Canadian Rifle Team that competed against teams from Great Britain, Australia and the United States for the Palma trophy in Ottawa in 1911.

## Owen Young Suggested for Mayor of New York

Under the caption, "Another Job for You, Mr. Young," newspapers in New York City controlled by Frank Munsey carried on their front pages on Dec. 18 a summons to Owen D. Young, colleague of Brig.-Gen. Charles G. Dawes on the Dawes committee and later Agent-General of Reparation Payments, to permit himself to be drafted as a candidate for Mayor in next year's election. Mr. Munsey said that New York City, now grown so big, is an empire in itself and that it needed Mr. Young to reorganize it, quite as Europe needed him and General Dawes. Mr. Munsey said that Mr. Owen's part in the Dawes Plan and later as Agent-General of Reparations Payments gave the world an example of keen vision.

G. F. McKay has been elected secretary of the Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md. He succeeds Thomas Mason, who also served as assistant to the president. J. A. Mellor has succeeded E. E. Polglase as master mechanic. E. A. Gannon is passenger agent and I. E. Ballard freight agent.

# H. A. Johnson on Important New Work

## Former President American Electric Railway Engineering Association Selected by Steam Railroads to Direct Exhaustive Investigation of Power Brakes

HARLEY A. JOHNSON, assistant to the general manager of the Chicago Rapid Transit Company and superintendent of shops and equipment of the Chicago, North Shore & Milwaukee Railroad, was appointed director of research of the American Railway Association, effective on Dec. 1, to take full charge of an extensive investigation of power brakes for both passenger and freight trains. Announcement of the appointment was made on Dec. 18. His selection to fill this very responsible post is a marked tribute to Mr. Johnson's ability and integrity as an engineer, and reflects credit on the electric railway industry as a whole and on the companies with which he has been associated continuously since graduation from Purdue University as a mechanical engineer in 1905. Credit to the Rapid Transit and the North Shore companies is further reflected by an agreement between the A.R.A. and President Britton I. Budd, under which Mr. Johnson will continue in his present capacity with those companies while at the same time directing this new work for the A.R.A.

### WILL DIRECT RESEARCH

This appointment of a director of research for the A.R.A. is the outgrowth of a report by the Interstate Commerce Commission pointing out the necessity for improvement in power brakes for passenger and freight trains, and laying down certain requirements that should be met by such brake systems in the interests of public safety. The A.R.A. was directed by the commission to prepare tentative specifications for brake equipment which would fulfill these requirements, and be suitable as the basis for negotiations leading to the formation of approved specifications and a formal order covering their adoption.

This decision in favor of undertaking a thorough investigation of the entire subject of power brakes followed a finding by the A.R.A. to the effect that the general principles of satisfactory brake operation adopted by the commission were at variance with what the railroads after their exhaustive investigations and extensive experience had thought safe and desirable. As a result the committee on safety appliances felt a grave responsibility involved in any recommendations which might be made. It thereupon cast about for a man to head this extremely important work. In the words of R. M. Aishton, president A.R.A., the following is an outline of the scope of the task to be undertaken:

> The appointment of a director of research required the retention of a man who would be a competent and practical engineer, of unquestioned ability and integrity, without railroad or manufacturing affiliation. The director will be empowered and authorized to take any action he deems necessary to enable him unqualifiedly to concur in the results of the tests, investigation and conclusions reached, such as surrounding himself if he so desires, with a staff of his own selection, sufficiently large and sufficiently competent to arrange for tests and so conduct them that every opportunity for criticism may be eliminated as to the decision having been influenced in any degree by railroads, manufacturers, patentees, or from any other source.
>
> The exisitng machinery of the Mechanical Division, American Railway Association (Safety Appliance Committee), will be prepared to act as an advisory committee to the director of research, if he so desires, and will arrange for the services of other existing committees, or the appointment of additional committees of the association as may be considered desirable by the director of research.
>
> The suggested scope of the work will include: investigation into the desirability and practicability of all designs and suggestions of possible merit in connecton with brake operation, giving special consideration to safety of operation through the incorporation of the apparatus so tested, of such functions as may be in existence or be suggested, that in the judgment of the director are worthy of consideration. This may, and probably will, necessitate the installation of a plant to test devices and functions under all possible conditions of service, in addition to technical tests, or may necessitate establishing on a single railroad, temporary service of a special character to enable the director to reach conclusions as to the effect on moving trains of any functio nsuggested that he desires to consider.



H. A. Johnson

In proposing Mr. Johnson to head this work, Mr. Aishton made the following statement:

> I don't know of anybody in the United States who is better fitted than Mr. Johnson to do a thorough job in a fearless way, from both a technical and practical standpoint, or who would so thoroughly cover every phase of the situation. His standing in the engineering and commercial field is beyond any question.

Mr. Johnson obtained some of his early experience in the steam road field. Previous to his graduation from Purdue University, he was employed at various times as draftsman, locomotive fireman, laboratory assistant and helper in the locomotive erecting shop of the Chicago, Burlington & Quincy Railroad. He entered the employ of the Metropolitan West Side Elevated Railway on Aug. 26, 1905, and has been with this company and its affiliated successor companies to the present time. He started at the bottom, as a helper in the repair shops on the maintenance of car equipment. He went into the drafting room in November, 1905, to engage in work on car design, traffic studies and maintenance of way. In April, 1907, he was made engineer of car equipment, and in December of the following year was promoted to master mechanic of the Metropolitan West Side Elevated Railway. When the four elevated roads in Chicago were placed under one operating management in 1911, his duties were extended to include these four roads. In 1915 his title was changed to superintendent of shops and equipment and in July 1916, he was also appointed superintendent of shops and equipment on the Chicago, North Shore & Milwaukee Railroad, which was awarded the first Coffin prize during the year 1923.

Mr. Johnson was made organization engineer on the Chicago Elevated Railroads in March, 1920, and remained superintendent of shops and equipment of the Chicago, North Shore & Milwaukee Railroad. During this time he analyzed operating methods, costs, etc., and prepared statistical information which was used as the basis of recommendations for improvement of methods, practices or processes in all departments. Again inherent ability and unusual personality resulted in rapid promotion. In December, 1921, he was made assistant to the general manager of the Chicago Elevated Railroads, but remained superintendent of shops and equipment of the Chicago, North Shore & Milwaukee Railroad. In this capacity he continued to be responsible for the design and construction of all new rolling stock.

### AN ANALYST OF GREAT ABILITY

Mr. Johnson's keen mind and breadth of vision were recognized by the companies with which he was associated, and he was repeatedly called upon to make extended investigations of other proprties for the purpose of bringing to the Rapid Transit Lines ideas for improvements in service suggested by the practices of others. In 1920 he accompanied the local transportation committee of the City Council of Chicago on a trip of inspection of the transportation facilities in a number of large cities in the country. In 1921 he was vice-chairman of a committee appointed by Samuel Insull to study the electrification of steam railroads in the United States and in this capacity traveled over approximately 95 per cent of the electrified steam railroad mileage in the country. In 1922 he was chairman of a committee of operating officials of the Chicago, North Shore & Milwaukee Railroad who visited the Pacific Coast and Texas cities to get ideas for improvements in service.

While president of the American Electric Railway Engineering Association, he, James W. Welsh, executive secretary of the association, and Harry L. Brown, editor ELECTRIC RAILWAY JOURNAL, were appointed as a special committee on foreign operations to investigate local transportation in England, Scotland, France and Switzerland. This committee submitted an extended report at the last convention, which was published in full in the ELECTRIC RAILWAY JOURNAL of Sept. 20, 1924.

Mr. Johnson is a member of the American Institute of Electrical Engineers, the Society of Automotive Engineers, Western Society of Engineers, American Electric Railway Association and the Western Railway Club.

# Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

## hicago "L" Orders 100 More De Luxe Cars

### nfort Features Embodied in an arlier Group of Cars Have Been Retained in New Vehicles

o give additional service on the ated lines, 100 new cars have been ered this month by the Chicago id Transit Company. In their de- and equipment these cars will be ilar to the group placed in service winter and described in detail in Jan. 12, 1924, issue of ELECTRIC LWAY JOURNAL. They will dupli- all of the de luxe features incor- ated in the former cars, which have ved very popular with the riding lic. A marked preference for this e of car has been noticeable on the t of passengers boarding the trains. use of spring upholstered plush ts is considered to be an important tor in this popularity and will there- be duplicated in the new cars. se will be built by the Cincinnati Company.

nterior trim, seating arrangements heating devices will be the same as he first group. With a view to making the cars as warm and soundproof as possible, the practice of using double wood floors is repeated. A ½-in. layer of compressed hair insulating material is laid between the steel underframe and the lower wood floor. On the previous group of cars this construction proved to be satisfactory from the standpoint of insulating the interior of the car from noise. Sound-insulating material is used also inside the side plates and above the headlining.

| | |
|---|---|
| nber of cars ordered | 100 |
| e of road | Chicago Rapid Transit Co. |
| e of order | About Dec. 1 |
| e of delivery | Starting July 1, 1925 |
| der of car body | Cincinnati Car Co. |
| e of car | Elevated, passenger |
| ing capacity | 52 |
| ght | |
| r body with control equipment | 43,700 lb. |
| rucks } quipment } | $1,300 lb. |
| otal | 75,000 lb. |
| ter centers, length | 33 ft. 8 in. |
| gth over all | 48 ft. 0 in. |
| k wheelbase | |
| otor | 6 ft. 6 in. |
| railer | 5 ft. 6 in. |
| th over all | 8 ft. 10 ½ in. |
| ght, rail to trolley base | 12 ft. 3 in. |
| y | Steel |
| rior trim | Mahogany |
| dlining | Steel |
| f | Arch |
| brakes | Westinghouse AMU |
| ature bearings | Plain |
| es | Heat-treated, Standard steel |
| pers | Hedley anti-climbers |
| signal system | Conductor's hand bell |
| trimmings | Statuary bronze |
| ter and side bearings, | Stucki side, railway standard center |
| dults and junction boxes | Metallic |
| plers, | utomatic, Van Dorn and Stern & Ward |
| tain material | Double-faced Pantasote |
| tination signs | Hunter |
| r operating mechanism, | National Pneumatic electro-pneumatic |
| d brakes, | lackhall handle and Peacock mechanism |
| dlights | Crouse-Hinds portable |
| rnal boxes | Symington |
| ors | Inside hung |
| nt and varnish | Chicago Varnish |
| ting material | Plush |
| k adjuster | Westinghouse Type J |
| ngs | Standard Steel Works |
| ley retrievers | Keystone |
| ley base | U. S.-13 F |
| cks | Baldwin equalizer |
| ilators | Railway Utility |
| els | Rolled steel, 21 in. and 34 in. |
| cial devices, etc. | Rico coasting recorders, Rico No. 5 "Steelkar" straps |

SUITABLE FOR SUBWAY OPERATION

In the design of all cars built for this company since 1914, the possibility of future subway operation has been borne in mind. When this group of 100 cars are delivered there will be a total of 455 steel cars suitable for subway operation. The details of the steel framing are very similar to the previous group and provision has again been made to allow a center door to be put in if desired. Four sliding doors, two in each end vestibule, are operated by National Pneumatic electro-pneumatic equipment, similar in design and construction to the type used before. The door control is arranged so that a guard between the two cars may control the adjacent doors in each car, or may take control of all four doors on each car, permitting a train to be operated with one guard for each two cars.

In accordance with previous practice, each car will be equipped with one motor truck and one trail truck, with two motors on the former. Trucks will be of Baldwin equalizing bar type. The motor trucks are equipped with 34-in. rolled steel wheels and the trailer trucks with 31-in. wheels. Motor and control equipment has not yet been decided upon.

The new cars will weigh approximately 75,000 lb. complete. This will be divided so that the car body with control equipment will weigh approximately 43,700 lb. and the trucks and motors will run 31,300 lb. Specifications are given in the accompanying table.

## Extensive Program for 1925

The Grand Rapids Railway, Grand Rapids, Mich., is planning to spend nearly $750,000 on maintenance of way and new equipment in 1925. Approximately 11,179 ft. of double track will be reconstructed. This, together with the installation of considerable special trackwork, two railroad crossings and various other jobs, will cost $298,557.

Additional rolling stock which it is proposed to buy consists of 30 lightweight, double-truck cars to cost approximately $12,000 each and eight Fifth Avenue type J buses at approximately $7,000 each. Among the accessories included in the 1925 program are 50 Wood fare boxes, 27 Kuhlman type E slack adjusters and 11 U type automatic slack adjusters for Birney cars.

A portable Ingersoll-Rand air compressor will be purchased for the way department and also a steam-driven concrete mixer. For use as an emergency truck it is planned to buy a 3-ton truck chassis. Shop facilities will be improved by the installation of a thermostatically controlled babbitt pot, an oven for babbitting and a number of compressed air hoists.

## Brill Gets Big Car Order

An order was placed this week with the J. G. Brill Company for 100 new cars for the Philadelphia Rapid Transit Company, Philadelphia, Pa. These will be of the single-end, front-entrance, center-exit type similar to the 385 cars ordered Jan. 22, 1923, and described in the ELECTRIC RAILWAY JOURNAL for March 10, 1923. One respect in which the new cars will differ from the first order is that they will be 3 in. longer, the added length being in front of the exit door. Delivery will commence in April, 1925. The cost of the cars will be in the neighborhood of $1,200,000, which, with the buses recently ordered by this company, will involve a total expenditure of nearly $4,000,000 for new rolling stock.

## Uniformity of Details with Existing Motors Desired in New Designs

We hear so much of the advantages of new equipment that we are liable to assume that there are no disadvantages. One of the chief criticisms heard of new designs is in regard to the lack of interchangeability of parts with those of existing equipment. A recent order for car equipments specified a type of motor brought out 15 years ago. Inquiry as to the reason for this choice brought out the fact that this railway had but one type of motor, although it was operating 600 motor cars. The officials of this road considered that the advantages of uniformity outweighed improvements in design.

The large parts of railway motors such as frames and housings are seldom replaced and interchangeability

## Metal, Coal and Material Prices

| Metals—New York | Dec. 16, 1924 |
|---|---|
| Copper, electrolytic, cents per lb | 14.625 |
| Copper wire base, cents per lb | 16.875 |
| Lead, cents per lb | 9.30 |
| Zinc, cents per lb | 7.75 |
| Tin, Straits, cents per lb | 55.75 |
| **Bituminous Coal f.o.b. Mines** | |
| Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons | $4.12½ |
| Somerset mine run, Boston, net tons | 2.125 |
| Pittsburgh mine run, Pittsburgh, net tons | 1.875 |
| Franklin, Ill., screenings, Chicago, net tons | 1.625 |
| Central, Ill., screenings, Chicago, net tons | 1.675 |
| Kansas screenings, Kansas City, net tons | 2.35 |
| **Materials** | |
| Rubber-covered wire, N. Y., No. 14, per 1,000 ft | $6.75 |
| Weatherproof wire base, N.Y., cents per lb. | 18.00 |
| Cement, Chicago net prices, without bags | 2.20 |
| Linseed oil (5-lb. lots), N. Y., per gal | $1.16 |
| White lead in oil (100-lb. keg), N. Y., cents per lb., carload lots | 0.157 |
| Turpentine (bbl. lots), N. Y., per gal | 0.84 |

with existing equipment is not a particular advantage. But repair parts such as armature coils, commutators, brushes, brush holders, field coils, bearings, gears and pinions must be kept on hand in considerable quantities for replacements and any reduction in the number of types that must be carried in stock is a great help to the railway. Several railways have rehabilitated their motors so as to reduce the number of bearings that must be kept on hand, others have made wholesale changes in gear ratio so as to provide uniform gearing. These are things that could have been incorporated in the original design without decreasing the number of new and valuable features.

There are also a number of things that may be considered as auxiliaries to the motors that are affected by motor design. Some of these are motor suspensions, connectors for motor leads, lengths of motor leads and the position on the motor where they are brought out. Uniform arrangement of these details by the motor manufacturers will do much to reduce the number of parts that must be carried in stock and also repairs. Railway officials are anxious to have improved equipment, but there is a strong feeling among the men responsible for maintenance that much can be done toward securing greater uniformity of detail parts.

## *Rolling Stock*

**Black River Traction Company, Watertown, N. Y.,** is remodeling its old two-man cars into one-man pay-as-you-enter type for use in Watertown, Brownville and Dexter.

**Detroit United Railway, Detroit, Mich.,** has ordered 100 buses instead of 75 as was at first planned. Ten of these single-deck buses have been loaned to the Wolverine Company for service between Detroit and Mount Clemens to replace antiquated equipment, and some of the first new buses to arrive are now on the Wyandotte-Trenton division. Buses and interurbans are being alternated as far as Farmington on that line.

**San Antonio Public Service Company, San Antonio, Tex.,** has placed an order for two more Reo model W pay-enter buses having a seating capacity for 21 passengers each.

## *Track and Line*

**Tri-City Railway, Davenport, Iowa,** is spending approximately $15,000 to reconstruct and lay new brick paving between its tracks on Second Avenue from Fifteenth Street to Seventeenth Street, according to an estimate made by T. C. Roderick, general manager.

**East St. Louis, Caseyville & Eastern Railroad, East St. Louis, Ill.,** has been granted a franchise by the St. Clair, Ill., Board of Supervisors for an electric line between Caseyville, Ill., and Washington Park, a suburb of East St. Louis. A clause provides that construction must start within one year. This is a new incorporation referred to in the ELECTRIC RAILWAY JOURNAL, issue of Oct. 18, 1924.

**Harrisburg Railways, Harrisburg, Pa.,** has completed its program of track reconstruction for this year. This included the rebuilding of between 4 and 5 miles of single track at a cost of approximately $250,000. In general A. E. R. E. A. standard 7-in. grooved girder rail was used with bolted joints seam welded. On most of this work International twin steel ties were installed.

**Chicago Surface Lines, Chicago, Ill.,** has extended the Belmont Avenue line from Cicero Avenue to Central Avenue.

**Reading Transit & Light Company, Reading, Pa.,** in co-operation with the City Council and people of the northeast section has opened up a 3-mile electric railway known as the northeast loop to serve the residential section of the northeast. The line, constructed in four months, was built by the people of the territory which it serves. The company will operate the line under a 999-year lease.

**Pittsburgh Railways, Pittsburgh, Pa.,** is laying new tracks and switches at Fifth Avenue, Grant and Diamond Streets in preparation for the short-looping of cars if the plan is given a trial.

**Springfield Street Railway, Springfield, Mass.,** has expended about $40,000 in new track installations and other improvements at Elm Street and Park Avenue, West Springfield, preparatory to the opening of the new North End bridge across the Connecticut River. The company has also expended $15,000 on replacements and improvements at the intersection of Main and Lyman Streets in Springfield, near the site of the new Union Station.

## *Shops and Buildings*

**Philadelphia Rapid Transit Company, Philadelphia, Pa.,** has completed its carhouse on the block bounded by Twentieth, Johnson and Nineteenth Streets and Moyamensing Avenue. The finished terminal, which is modern in every respect, came within the estimated cost of $1,500,000. It has a capacity of 450 cars.

**Birmingham Electric Company, Birmingham, Ala.,** will abandon the East Lake carhouse in a short time under a plan to centralize all existing railway repairs and storage operations in its Third Avenue carhouse. The reason for this movement is to increase the efficiency of the company, allowing the organization to maintain a smaller number of men in its shops department. Need of improvements at the East Lake carhouse and the paving of First Avenue are also factors in the move. J. S. Pevear, general manager, estimates that to equip the old carhouse would require an extra expenditure of about $40,000 in the paving project. Future use of the East Lake carhouse has not been definitely determined by company officials, but this property will not be sold at present.

## *Trade Notes*

**Johns-Manville, Inc., New York N. Y.,** manufacturer of building materials, automotive equipment, asbestos specialties, fire extinguishers and electrical products, is to establish a factory in New Orleans. It has leased the building of the American Cotton Oil Company of Gretna. This has 50,000 sq.ft. of space under one roof and is on a 5-acre site. The first unit will be in operation by April, it is announced.

**Magnetic Signal Company, Los Angeles, Cal.,** has arranged with the General Railway Signal Company, Ltd. Montreal, to handle the magnetic flagman and accessories in the territory of Winnipeg and east thereof. Arrangements have also been completed with the Canadian Fairbanks-Morse Company of Vancouver, to act as agents for all the territory to the west of Winnipeg.

**Conveyors Corporation of America Chicago, Ill.,** announces the appointment of C. S. Price, First National Bank Building, Hazleton, Pa., as its district representative for northeastern Pennsylvania. Associated with Mr. Price in the sale of the American Steam Jet Ash Conveyor is E. E. Elliott, who has had wide experience in steam jet ash disposal engineering.

**Glenn D. Evans** has again joined the J. F. Buhr Machine Tool Company, Detroit, in the capacity of chief engineer. Mr. Evans has been chief engineer of the Climax Engineering Company of Los Angeles during the past three years.

## *New Advertising Literature*

**G. C. Kuhlman Car Company, Cleveland, Ohio** has issued an illustrated booklet on the type G steel-frame bus bodies.

**Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.,** in a publication called "Recent Developments in the Art," has recorded briefly some of the more important developments which this company has contributed to the electric railway industry during the past two years. This booklet was published for use as a guide reference in the Westinghouse booth at the A. E. R. A. convention last October, the new equipment or parts of equipment included in the exhibit having been marked with an orange star to indicate its newness, and the references in the book are similarly marked. The motive behind each development and advantages of its use over the previous part is briefly related for each subject covered. Another publication issued by the company describes the latest development in HL control, designed primarily for use on low-floor cars. Another leaflet contains application and performance data and construction details of the No. 333-V line of railway motors. An outline drawing with important dimensions is included. "The Trolley Bus—Its Application and Equipment" is the subject of the third leaflet.

# How the Navy hits when the power fails!

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

The big guns of our fleet can be fired when the power fails.

*Uncle Sam's Navy is always ready* and many a Bull's eye has been made when the electric power failed and it was necessary to fire by percussion.

The "Gun Captain" has equipment for emergencies—loose connection or trouble in transmission from the generator does not prevent the big guns from going off—that is one of the reasons why the Navy is so efficient.



# How about the motorman!

Is he equipped with Peacock Staffless Brakes for emergencies?

Can Motorman Jack control his car when the regular service fails and shift over to an emergency system with the same confidence as the "Gun Captain"—or will he hit something not exactly a Bull's eye?

Peacock Brakes can be depended upon to stop the car *before it hits* the object or obstacle on the track.



The Peacock Staffless

Increased safety is gained, together with a reduction in hand-brake maintenance costs, where Peacock Brakes are used. Peacock Brakes seldom need repairs.

Peacock Brakes have been designed with long experience and practical knowledge of emergency conditions. A few turns of the wheel will bring the heaviest car to a smooth swift stop.

Any motorman is master of his car when it is equipped with Peacock Brakes. He is always ready for an emergency stop.

**NATIONAL BRAKE COMPANY, Inc.**

**890 Ellicott Square, Buffalo, New York**

***Canadian Representative:*** **Lyman Tube & Supply Co., Ltd., Montreal, Canada**

# Bankers and Engineers


**Ford, Bacon & Davis**
Incorporated
Engineers
115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

**The J. G. White Engineering Corporation**
Engineers—Constructors
Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.
43 Exchange Place New York

**STONE & WEBSTER**
Incorporated
EXAMINATIONS REPORTS APPRAISALS
ON
INDUSTRIAL AND PUBLIC SERVICE PROPERTIES
NEW YORK BOSTON CHICAGO

**THE BEELER ORGANIZATION**
ENGINEERS AND CONSULTANTS
Traction-Traffic-Equipment-Power
COORDINATION OF SERVICE IMPROVED OPERATIONS
INCREASED TRAFFIC FINANCIAL REPORTS
APPRAISALS—MANAGEMENT
52 Vanderbilt Ave. New York City

**SANDERSON & PORTER**
ENGINEERS
REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS
RAILWAY, LIGHT and POWER PROPERTIES
CHICAGO NEW YORK SAN FRANCISCO

**ENGELHARDT W. HOLST**
*Consulting Engineer*
Appraisals, Reports, Rates, Service Investigation, Studies on Financial and Physical Rehabilitation Reorganization, Operation, Management
683 Atlantic Ave., Boston, Mass.

**ALBERT S. RICHEY**
ELECTRIC RAILWAY ENGINEER
WORCESTER, MASSACHUSETTS
REPORTS - APPRAISALS - RATES - OPERATION - SERVICE

**WALTER JACKSON**
*Consultant on* Fares and Motor Buses
The Weekly Pass—Differential Fares
Ride Selling
143 Crary Ave., Mt. Vernon, N. Y.

**J. ROWLAND BIBBINS**
*Engineer*—2301 Connecticut Ave., N. W. Washington, D.C.
TRANSPORTATION SURVEYS
Organized Traffic Relief and Transit Development
Co-ordinating Motor Transport, Railroad and City Plans, Service, Routing, Valuation, Economic Studies
EXPERIENCE IN 20 CITIES

**DAY & ZIMMERMANN, INC.**
ENGINEERS
DESIGN - CONSTRUCTION - REPORTS
VALUATIONS - MANAGEMENT
NEW YORK PHILADELPHIA CHICAGO

**STEVENS & WOOD, INC.**
Design and Construction of Power Stations
Railroad Electrification, Industrial Plants
REPORTS AND APPRAISALS
*Management and Financing of Utilities and Industrials*
Mahoning Bank Bldg. Youngstown, O.
120 Broadway New York

**JAMES E. ALLISON & CO.**
Consulting Engineers
Specializing in Utility Rate Cases and Reports to Bankers and Investors
1017 Olive St., St. Louis, Mo.

**HEMPHILL & WELLS**
CONSULTING ENGINEERS
Gardner F. Wells Albert W. Hemphill
*APPRAISALS*
INVESTIGATIONS COVERING
Reorganization Management Operation Construction
43 Cedar Street, New York City

**HUMAN ENGINEERING**
*Railway Audit and Inspection Company, Inc.*
*Fourth and Chestnut Sts., Philadelphia*
Boston New York Baltimore Atlanta
New Orleans Pittsburgh BRANCHES Chicago St. Louis

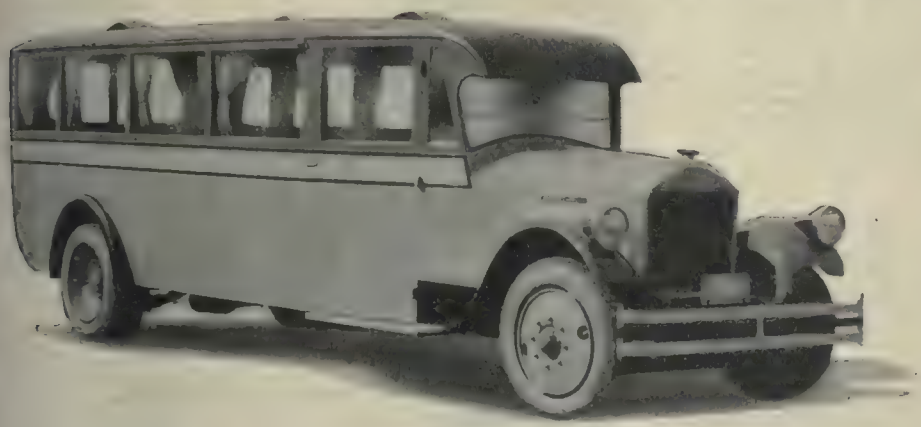
**Dwight P. Robinson & Company**
Incorporated
Design and Construction of
*Electric Railways, Shops, Power Stations*
125 East 46th Street, New York
Chicago Youngstown Atlanta Philadelphia
Los Angeles Montreal Rio de Janeiro

**KELLY, COOKE & COMPANY**
Engineers
149 BROADWAY NEW YORK
424 CHESTNUT STREET PHILADELPHIA

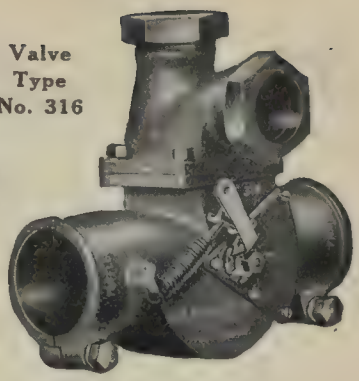
## American Body Company
**Buffalo, New York**

*USES*

# *The* PETRY Bus Heating System



Valve Type No. 316



**N. A. PETRY COMPANY, Inc.**

347 North Randolph St. Philadelphia, Pa.

*Pacific Coast Representative: Norman Cowan Co. 451 Rialto Bldg., San Francisco*

***Some Other Users***

Boston Body Co.
J. G. Brill Co.
Camden County Bus Association
Champion Auto Equipment Co.
Consolidated Body Co.
Edwards Railway Motor Car Co.
Fifth Avenue Coach Co.
Fremont Metal Body Co.
Garford Motor Truck Co.
General Motors Truck Co.
Hahn Motor Truck Co., Inc.
Hampstead Mill and Body Works
International Harvester Co.
International Motor Co.
G. C. Kuhlman Car Co.
Niagara Motor Boat Co.
Paterson Vehicle Co.
Pioneer Auto Works
Union Motor Truck Co.
Wiener Auto Body Co.
The Yellow Coach Mfg. Co.

*BUS HEATING SYSTEMS* **PETRY** *HEATER AND TUNING-UP VALVES*

## JOE R. ONG
**Consulting Transportation Engineer**

***Specializing in Traffic Problems and in Methods to Improve Service and Increase Efficiency of Operation***

PIQUA, OHIO

C. B. BUCHANAN, President — W. H. PRICE, JR., Sec'y-Treas. — JOHN F. LAYNG, Vice-President

## BUCHANAN & LAYNG CORPORATION
***Engineering and Management, Construction, Financial Reports, Traffic Surveys and Equipment Maintenance***

BALTIMORE, 825 Equitable Bldg. — Phone: Hanover 2142 — NEW YORK, 49 Wall Street

## THE P. EDWARD WISH SERVICE
50 Church St. NEW YORK — *Street Railway Inspection* DETECTIVES — 131 State St. BOSTON

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

## Transmission Line and Special Crossing Structures, Catenary Bridges
WRITE FOR OUR NEW DESCRIPTIVE CATALOG

**ARCHBOLD-BRADY CO.**
Engineers and Contractors — SYRACUSE, N. Y.

The Most Successful Men in the Electric Railway Industry read the

## ELECTRIC RAILWAY JOURNAL

Every Week

## A. L. DRUM & COMPANY
***Consulting and Constructing Engineers***
VALUATION AND FINANCIAL REPORTS
RATE STUDIES FOR PRESENTATION TO PUBLIC SERVICE COMMISSIONS
CONSTRUCTION AND MANAGEMENT OF ELECTRIC RAILWAYS

230 South Clark Street, Chicago, Ill. — 215 South Broad Street, Philadelphia, Pa.

## Bureau of Commercial Economics, Inc.
*Industrial Engineers*

Organization · Methods · Layout and Facilities
Public and Industrial Relations

72 West Adams Street · CHICAGO

# The New GARFORD Highway Coach

## K-B SIX CYLINDER MODEL

### SPECIFICATIONS

*Wheelbase:* 180". Overall length 242". Extreme width 76". Long wheelbase provides easy riding and prevents excessive body overhang.

*Low Chassis Frame:* 20½" from ground.

*Six Cylinder Engine:* Specially designed for coach work 3½" x 5". High speed, high powered providing flexible operation.

*Special Body:* Extra heavy door hinges. Bottom of door extends below floor of coach, minimizing floor drafts. All seats equipped with double deck springs and extra deep cushions; backs tilted to assure comfort. Long flexible springs—wide spring centers on rear axles prevent body sway.

*Ventilation* is adequate. Wind breaks on all doors.

*Heating System:* Modern and ample.

*Baggage* section in rear. Side door with wind break instead of rear door prevents suction of dust into baggage.

*Four wheel hydraulic brakes;* emergency brakes on rear wheels. Thorough accessibility to all units.



This 6 cylinder 15 passenger coach, is the latest achievement of Garford engineers. As the prime object of a motor coach is profit to the operator, Garford engineers have given features to this model which encourage patronage.

Its passenger car lines please the eye and satisfy the desire for safety. Over-all its height is only 80 inches—not as high as most personal sedans.

Deep cushioned spring seats are as comfortable as they look.

Vibration has been minimized by the six cylinder motor specially built for coach work and ease of handling permits good progress through traffic.

All together the Garford K. B. Highway Coach gives comfort for passengers, profit for operators and pleasant driving for chaufteurs.

Other models to 30 passenger capacity.

The Garford Bus Development Bureau has available a wealth of information on coach operation which it offers to operators. Write us on any problem affecting bus operation.

The GARFORD MOTOR TRUCK COMPANY, Lima, Ohio

# GARFORD

*Beginning in 1902, Garford is now among the eight companies manufacturing 78% of the bona-fide trucks*

BUILDING TODAY FOR TOMORROW'S REQUIREMENTS



# St. Louis Built-
# *Ever-Wear* STEEL BODIES
## *for Street Railways-*

## It Reflects the Standard of Its Builders

THIRTY-FIVE years of a consistent "Quality" policy has definitely established the reputation of St. Louis Cars and Equipment.

In back of every St. Louis "Ever-Wear Steel Body" is not only the vast experience in railway body building but a reputation for quality products that is universally recognized.

The illustration shows a 29-passenger Ever-Wear steel body built for the Houston Electric Company. This body will survive the chassis in normal service.

"Ever-Wear" steel bodies are built for railways only, and to conform to the most exacting requirements.

*Write us today for further details.*

**St. Louis Car Company**
St. Louis, Mo.

**Western Red Cedar**

**Light, Durable and Strong Plain or Treated Poles**

**Northern White Ceda**

NPCO

*What does it stand for?*

It is a stamp of approval placed on the butt of every National cedar pole after it has measured up to the specifications of the National Pole Company, for 45 years the largest shippers of cedar poles in the world. It is for your protection — it is our guarantee of a perfect product.

**NATIONAL POLE COMPANY**

**Escanaba, Michigan**

*Western Electric Company*, Distributors

*Sales Offices in 47 Principal Cities*



# SLIDING CONTACT approved!

## lere are some expert opinions—

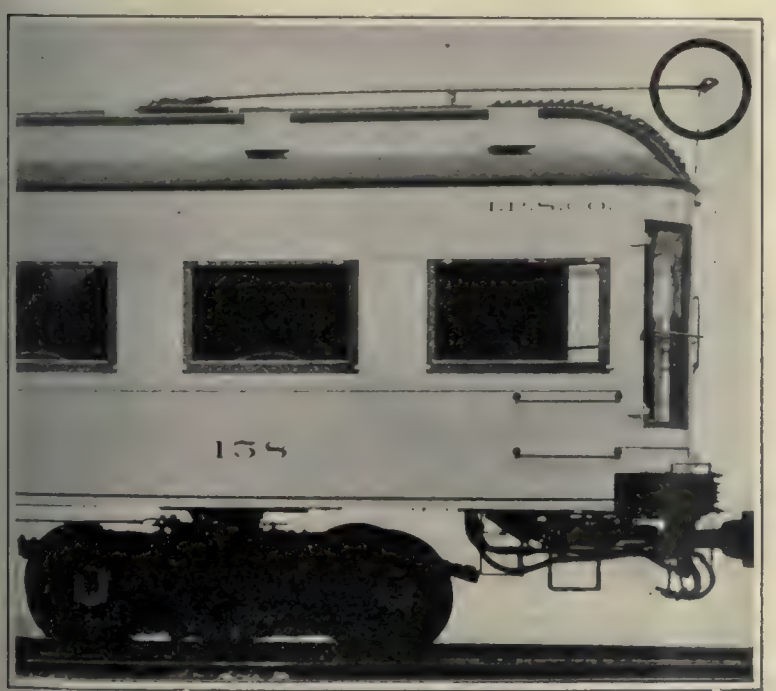
answer to a questionnaire sent out by the American tric Railway Association, these *enlightening* comments e in.

question was:—*"What are the merits of the sliding tact shoe as compared to the trolley wheel for* 600 *volts, . operation?"*

answer by A. F. Townsend, Manager, Eastern Texas tric Co., included this:—".....it has greater con- area, holds the wire better than the wheel and transmits power to the motor with greater efficiency. There is arcing, and micrometer tests show that the wear on the wire is no greater than with the wheel. The results obtained are: fewer trolley breaks, fewer dewirements of trolleys and smoother operating motors."

Another answer, by W. E. Brown, Supt. of Power, Houston Electric Co., stated: "Keeps wire better at high speed; less arcing; better contact and cooler motors."

Here is the comment of John Hickok, Supt. of Ry. Dept., Pacific Northwest Traction Co.:—"Sliding contact gives increased conductivity, does not bound from trolley and dewiring is much less frequent."



## Have you tried this ? It's the Miller Trolley Shoe

**(Patented)**

Used by all those roads whose officials are quoted above. Used on the handsome cars of the Interstate Public Service Company, illustrated at the left. Used by many other roads all over this country and abroad.

They have tried it and found that the sliding contact system with Miller Trolley Shoes gives most satisfactory and economical results.

Have you really tried it—under right conditions?

*Write for our trial proposition*

## Miller Trolley Shoe Company

**295 Columbia Road, Boston, Mass.**

Western Representative, Economy Electric Devices Co., 1590 Old Colony Bldg., Chicago, Ill.

# When Concrete is Use

## a Tie Should Do MORE Than Just Support the Rails



A TIE that does no more than just support the rails does not measure up to what a real tie should be.

1st. It should not displace any more concrete than is necessary.

2nd. It should be so constructed that it will protect the concrete, and preserve it against disintegration.

# DAYTON

# or Track Foundation

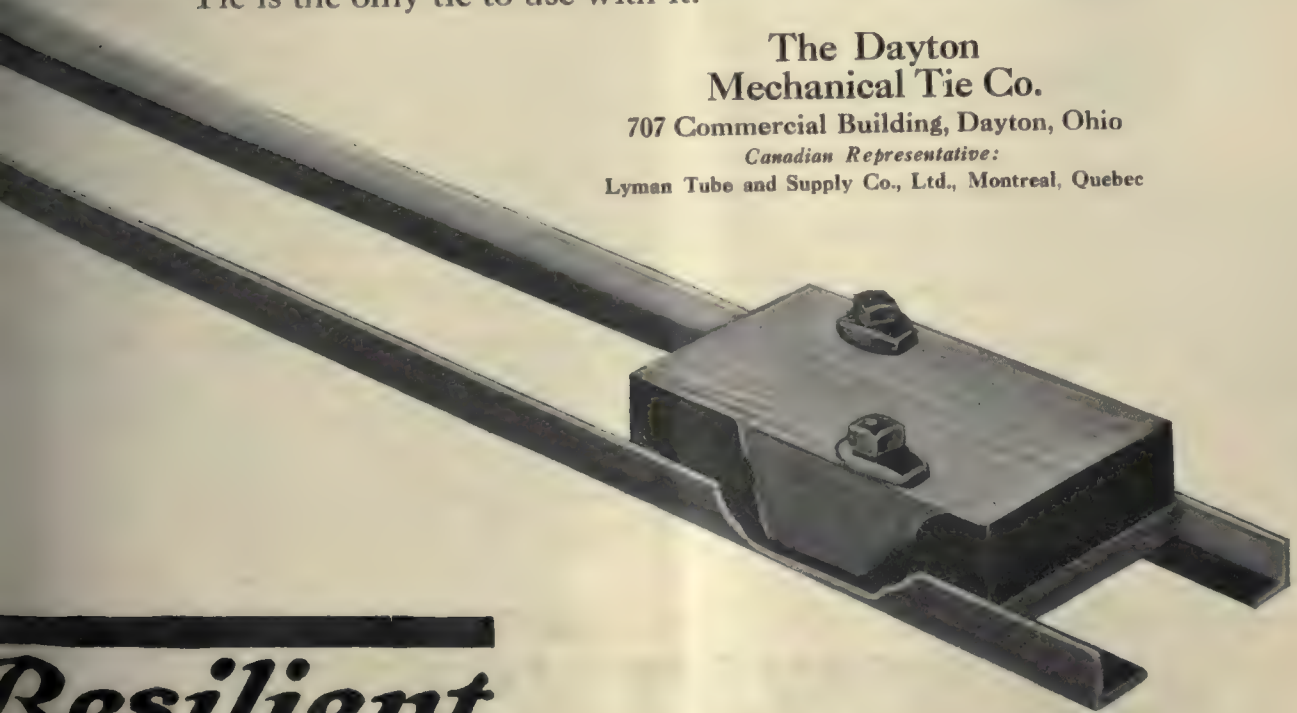
The increased weight of trucks over streets necessitates a paving foundation that will withstand this concentrated weight.

The wood tie on ballast necessarily displaces a certain amount of concrete, leaving only a thin coating of concrete above the tie. This coating gives way, and allows water to reach the ballast foundation, which soon buries itself in the subsoil, causing a sinking of the track, and a breaking of the paving.

The Dayton Tie is designed to overcome these weak places, by maintaining a uniform thickness of concrete throughout, besides reinforcing the concrete itself with the steel angles. To secure the maximum service from concrete it should not be permitted to disintegrate under the shocks of traffic. It will go to pieces if nothing is done to absorb the shocks. The tie itself should contain the cushion. This the Dayton Tie does. Resiliency is its fundamental principle.

Obviously concrete is the foundation to use, and the Dayton Tie is the only tie to use with it.

**The Dayton Mechanical Tie Co.**
707 Commercial Building, Dayton, Ohio
*Canadian Representative:*
Lyman Tube and Supply Co., Ltd., Montreal, Quebec



**Resilient TIE**

Cushions the Shock
On Rolling Stock



# Figure the Value of Creosoted Ties on the Life Basis

SOUND, well treated ties retain their original strength and yield a life in track of two to several times that of untreated ties.

It is authoritatively estimated that this increase in tie life saves ten or more cents per tie per year. The total saving increases as the number of treated ties in track increases for the yearly tie requirements and the expense for labor in replacing and maintenance of ties is decreased proportionately.

The value and economy of treated ties is generally recognized. This is borne out by the fact that in 1860 about one-tenth of one per cent of the ties used were treated while today more than 50 per cent are treated.

To obtain quality ties, you should consult tie specialists. That's our business—one we have been engaged in for over twenty years.

***International*** Ties are ***Uniform in Production*** because our producers are experienced in the characteristics of the timber in their territory.

***International*** Ties are ***Uniform in Inspection*** because the A. R. E. A. specifications are rigidly enforced.

***International*** Ties are ***Uniform in Treatment*** because of the high grade creosote oil and the modern mechanical devices used to insure good and effective penetration.

***The International Dating brands the tie that lasts longest. We are now accumulating ties for treatment and delivery next spring. Take advantage of this opportunity. Contract now for your 1925 requirements.***

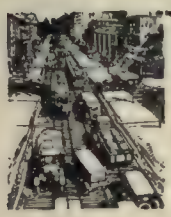
**International Creosoting & Construction Co.**

General Office—Galveston, Texas

Plants: Texarkana, Texas  Beaumont, Texas  Galveston, Texas

# *International* Standard Specification Ties

# Winter— the foe of poor pavements— leaves VITRIFIED BRICK unimpaired



WHEN your plows and sweepers have cleared a narrow aisle through the snow and traffic concentrates in that strip, the wear-and-tear on your pavement is multiplied many times.

Then you are fortunate if you have paved with vitrified brick, asphalt-filled. The grind of truck and auto chains leaves the fire-toughened brick unscathed by abrasion. Jolts and impact are absorbed by the flexible wearing surface. Your road-bed remains protected beneath the tight water-seal of the filler.

## Six-point-service—

I
absorbs impacts at rail joints

II
water-seals road-bed and ties

III
allows for contraction and expansion

IV
resists heaviest traffic

V
is easily removable for track repairs

VI
practically 100% salvage value

VITRIFIED Brick PAVEMENTS



## OUTLAST THE BONDS

NATIONAL PAVING BRICK MANUFACTURERS ASSOCIATION, ENGINEERS BLDG., CLEVELAND, OHIO



Alton Brick Company, Alton, Ill.
Binghamton Brick Company, Binghamton, N. Y.
Central Clay Products Co. (Distributors MACK Paving Brick), Wilkes-Barre, Pa.
Cleveland Brick & Clay Company, Cleveland, Ohio
Clydesdale Brick & Stone Co., Pittsburgh, Pa.
Coffeyville Vitrified Brick & Tile Co., Coffeyville, Kans.
Collinwood Shale Brick Company, Cleveland, Ohio
Francis Vitric Brick Company, Boynton, Okla.
Georgia Vitrified Brick & Clay Co., Augusta, Ga.
Globe Brick Company, East Liverpool, Ohio
Hisylvania Coal Co., Columbus, Ohio
Hocking Valley Brick Company, Columbus, Ohio
Independence Paving Brick Co., Independence, Kans.
Metropolis Paving Brick Co., Pittsburg, Kansas
Metropolitan Paving Brick Co., Canton, Ohio
Mineral Wells Paving Brick Co., Mineral Wells, Texas
Moberly Paving Brick Company, Moberly, Mo.
Murphysboro Paving Brick Co., Murphysboro, Ill.
Nelsonville Brick Co., Nelsonville, Ohio
Peebles Paving Brick Company, Portsmouth, Ohio
Purington Paving Brick Company, Galesburg, Ill.
Southern Clay Mfg. Company, Chattanooga, Tenn.
Springfield Paving Brick Company, Springfield, Ill.
Sterling Brick Company, Olean, N. Y.
Streator Clay Mfg. Company, Streator, Ill.
Thornton Fire Brick Co., Clarksburg, W. Va.
Thurber Brick Company, Ft. Worth, Texas
Toronto Fire Clay Company, Toronto, Ohio
Trinidad Brick & Tile Company, Trinidad, Colo.
Veedersburg Paver Company, Veedersburg, Ind.
Western Shale Products Company, Fort Scott, Kans.
Westport Paving Brick Company, Baltimore, Md.

# Scientific Lubrication will Cut Your Costs



THE highly specialized machines which industry employs require highly specialized lubricants if they are to function at highest efficiency. This need of special lubricants is encountered at every point throughout the plant. It starts with the lubrication of the prime movers in the power plant, follows along the shafts and drives by which power is transmitted and distributed and ends only in the machines which utilize this power to convert raw materials into finished parts or products.

Recognizing the need of quantity production, Industry provided itself with new types of high speed machines. That such machines required special lubricants became apparent immediately. Our engineers therefore made analyses of the operation of machines of every class and description.

They determined the exact qualities and properties a lubricant should possess to lubricate perfectly any particular machine. After establishing these facts, they were able to produce the new lubricants needed, though only after months, and in many cases, years, of research and experimentation. Today, this company is producing a complete line of

## Standard Oils and Greases

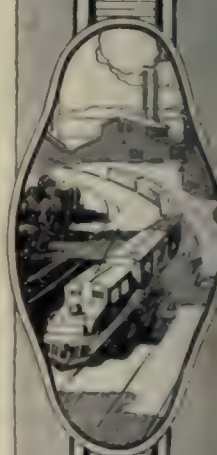
some one of which will exactly meet the lubrication needs of each mechanism. These lubricants are always uniform and each serves perfectly the purpose for which it is produced.

As each lubricant is made for a special purpose, it is of great importance to use them in the proper place and proper manner. To insure their proper use, the company places the services of its lubricating engineers, free of charge, at the disposal of industry throughout our territory.

Upon request, they will visit your plant, make a complete survey of your lubrication system and submit a report on it, together with their recommendations. They will point the way to more efficient lubrication, which means lower operating costs.

To avail yourself of this service does not obligate you and you are, of course, free to follow their suggestions, or not, as you may see fit. We will welcome an opportunity to render you this service at any time, though preferably now.









## STANDARD OIL COMPANY
(INDIANA)

**General Offices: 910 S. Michigan Avenue, Chicago, Illinois**

| ILLINOIS | INDIANA | IOWA | MICHIGAN | WISCONSIN | MISSOURI |
|---|---|---|---|---|---|
| Chicago | Evansville | Davenport | Detroit | La Crosse | Kansas City |
| Decatur | Indianapolis | Des Moines | Grand Rapids | Milwaukee | St. Joseph |
| Joliet | South Bend | Mason City | Saginaw | MINNESOTA | St. Louis |
| Peoria | KANSAS | Sioux City | N. DAKOTA | Duluth | |
| Quincy | Wichita | S. DAKOTA | Fargo | Mankato | |
| | | Huron | Minot | Minneapolis | |




# BOYERIZE!



If you are on the green or finishing up the building of your cars—it's the final touch that counts.

Use Boyerized Parts—and put in the final touch. This peculiar process imparts a tough, hard finish which makes Boyerized Parts wear-resisting and last three or four times longer than ordinary steel.

Boyerizing is a process that puts an armorplate wearing surface on iron and steel and a guarantee of durability, proved by the experience of leading railway maintenance men.

It's poor economy to purchase parts that will not stand up just because they are slightly cheaper, when Boyerized parts last three or four times as long, and cost but little more to start.

## McArthur Turnbuckles

McArthur Turnbuckles are just one example of the Boyerized line. The illustration is an enlarged view of the business end of the McArthur Turnbuckle.

***The Long-Life List***

**They are BOYERIZED Parts**

**Brake Pins**
**Brake Hangers**
**Brake Levers**
**Pedestal Gibs**
**Brake Fulcrums**
**Center Bearings**
**Side Bearings**
**Spring Post Bushings**
**Spring Posts**
**Bolster and Transom Chafing Plates**
**McArthur Turnbuckles**
**Manganese Brake Heads**
**Manganese Truck Parts**
**Bushings**
**Bronze Bearings**

## Bemis Car Truck Company

***Electric Railway Supplies***

**Springfield, Mass.**

**REPRESENTATIVES:**

Economy Electric Devices Co., Old Colony Bldg., Chicago, Ill.
J. H. Denton, 1328 Broadway, New York City, N. Y.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.
W. F. McKeney, 54 First Street, Portland, Oregon
A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.

# SPAIN *Says:*

T. S. Q. means this

...de la Concepción y algunas en la Ciudad Lineal.

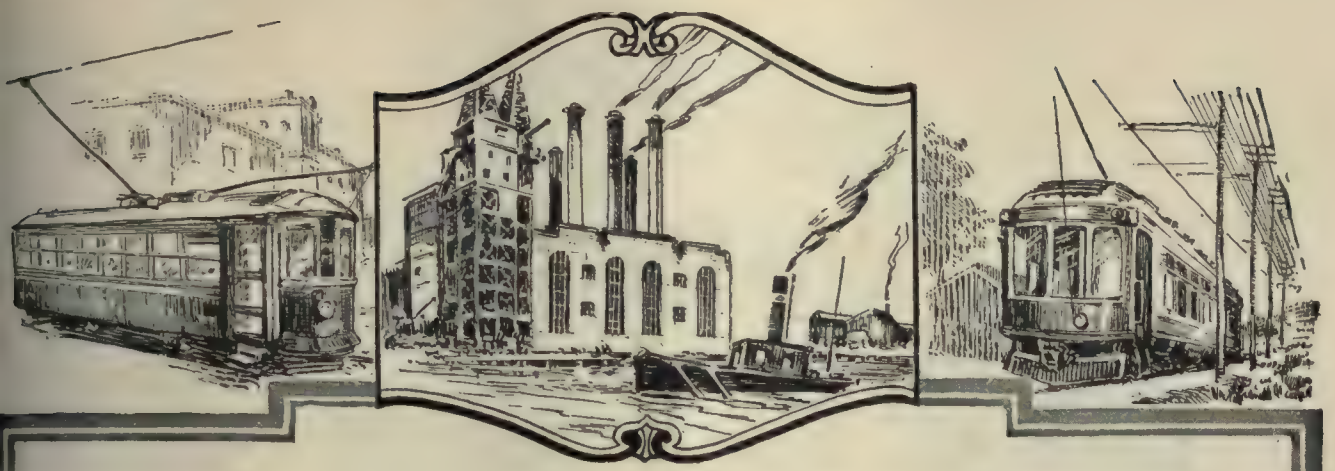
*Material móvil.*—Muy importante, tanto como necesaria, ha sido la renovación de piezas, mereciendo especial mención el importante suministro hecho por los Talleres de Deusto de piezas para los trucks; los engranes, piñones de acero especial de la más acreditada marca en el mundo, «Tool steel»; un hogar de cobre de la casa alemana Orenstein y ...

***Translation*** "Very important and necessary has been the purchase of repair parts and we make special reference to the gears and pinions of the most famous make in the world, the "Tool Steel."

A large company in Spain, in its annual report to stockholders, commenting on its financial showing and *good management*, includes the above paragraph.

"Tool Steel" Quality T. S. Q. "Tool Steel" Quality

**Tool Steel Gear and Pinion Co.**
Cincinnati, Ohio



# Your True Test of Lubricants Should be:

As to the products themselves:—

Their ***record*** in actual use

Their ***economy*** for all purposes

The ***responsibility*** of the company producing them

Their ***reputation*** among the men who use them

As to a company's service:—

The ***experience*** of its lubricating engineers

Their ***initiative*** in attacking all problems

The ***judgment*** behind their recommendations

The ***honesty of purpose*** which characterizes all their work

## *Check* **TEXACO** *against these items*

THE TEXAS COMPANY

DEPT. R-J. 17 BATTERY PLACE · NEW YORK CITY

HOUSTON · CHICAGO · NEW YORK

OFFICES IN PRINCIPAL CITIES



# Collier Service

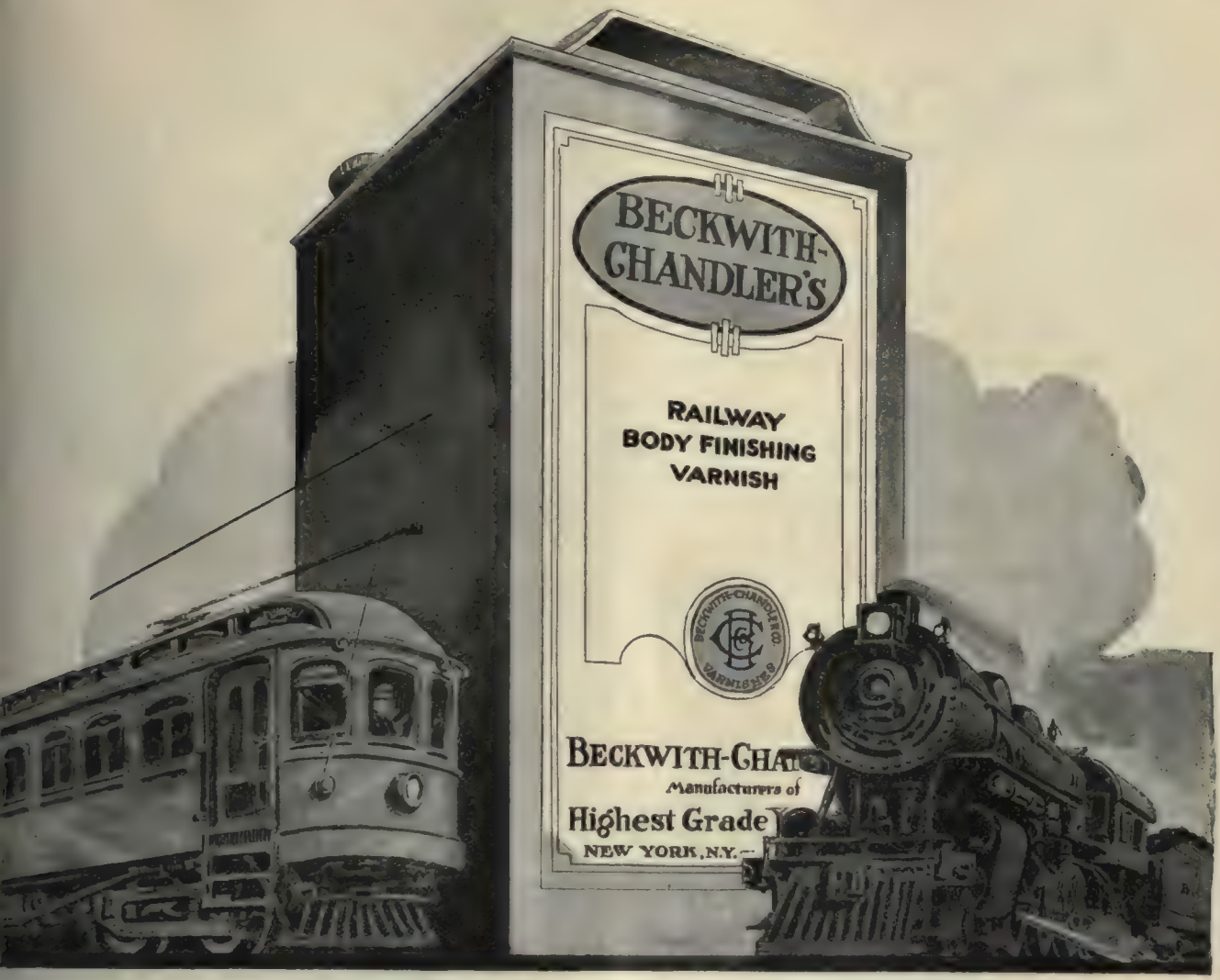
A nation-wide organization building and sustaining car cardadvertising space values



**Barron G. Collier, Inc.**

Candler Bldg.

**New York**




# *Standard Varnishes and Colors*—

## for transportation service—

For many years the name *Beckwith-Chandler* has stood for the highest quality finishes for steam and electric railway cars. The durability of these products under severe operating and climatic conditions has been proved by the experience of many of the leading railroads of the country.

There are specific Beckwith-Chandler products for every part of the car—exterior, interior, roof, headlining, cane seats, floor and trucks.

We can supply finishes in the flat color and varnish systems, enamel systems or color varnish systems.

**NEOLITE—the new Pyroxylin finish is another Beckwith-Chandler development.**

**Make Beckwith-Chandler products your paint shop standard.**

## BECKWITH-CHANDLER COMPANY

***Manufacturers of Highest Grade Varnishes***

**NEW YORK, N. Y.** **NEWARK, N. J.**

# Security

The confidence purchasers of street car equipment have in the dependability of More-Jones Quality Products is evidenced by more repeat orders during 1924 than we have previously experienced. Having once realized that there is a certain definite security in these products it is only a natural procedure for the man who knows to specify More-Jones Quality Products. Your purchases, therefore, of these products during 1925 will mean security for you all the way thru.

*Write for further information and prices.*

MORE-JONES BRASS & METAL CO.
St. Louis, Mo.

## MORE-JONES QUALITY PRODUCTS



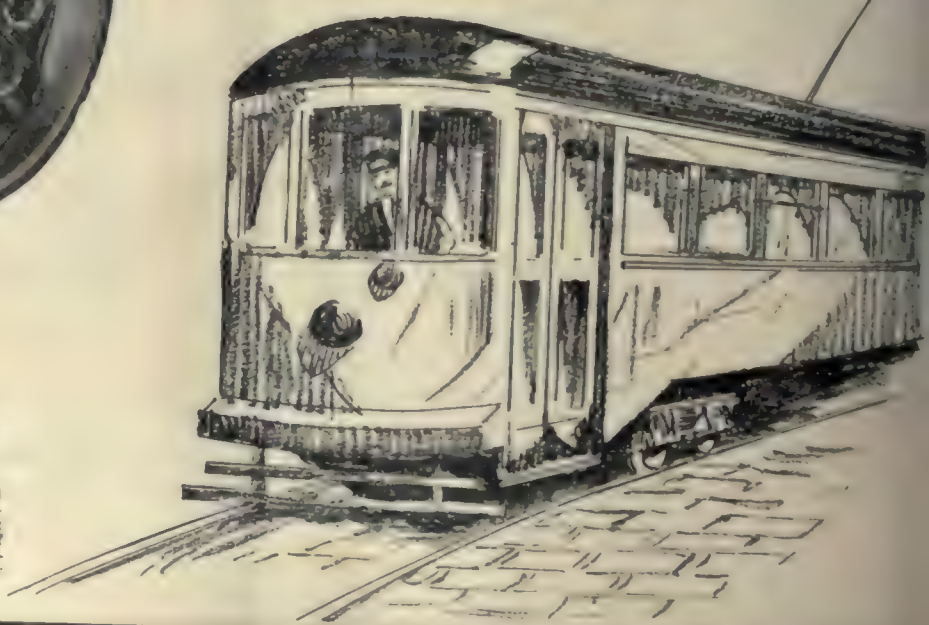
**M-J Armature Babbitt**
—for railway armature bearings, scientifically compounded of pure new tin, copper, antimony and metallic nickel—no lead. Guaranteed most economical. Lasts much longer.

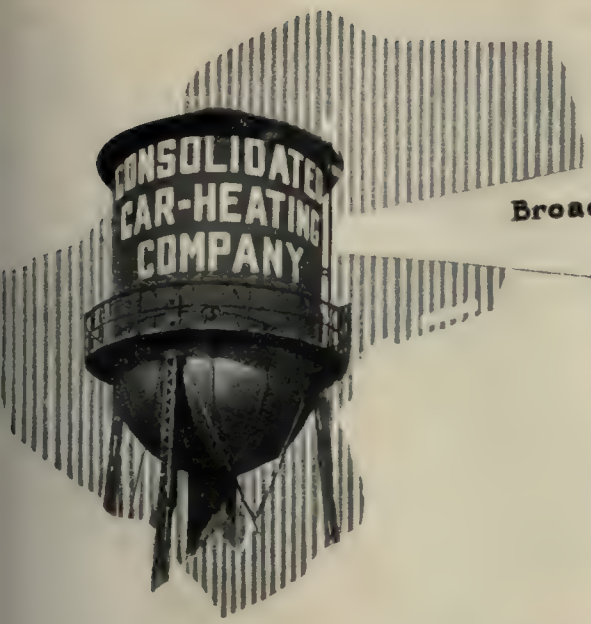


**"Tiger" Bronze Axle and Armature Bearings**
Their exceptional toughness and high anti-frictional qualities insure great strength and slow, even rate of wear.



**M-J Lubricated and V-K Oilless Trolley Wheels and Non-Arcing Harps**
The pure new metal used in the wheels is exceedingly tough, yet does not grind away the metal of the wire. Perfect lubrication is automatically accomplished.






Broadcasting Buzzers and Bells from Station CCH

This is Station CCH, the Consolidated Car Heating Company, broadcasting from Albany, N. Y. The subject of the talk this week is Car Signaling Equipment.

# Consolidated High Voltage System

REQUIREMENTS of modern transportation service have rendered obsolete the ell cord pulled by hand, and its makeshift ccessor, the dry-battery bell system. Conlidated Car Heating Company was the first develop a high-voltage buzzer and bell-gnal system. Today, the name Consolidated eans the latest and best in car-signaling quipment, including buzzers, single-stroke ells, push buttons, motorman's signal lights, nd accessory equipment such as resistances, se boxes, etc.

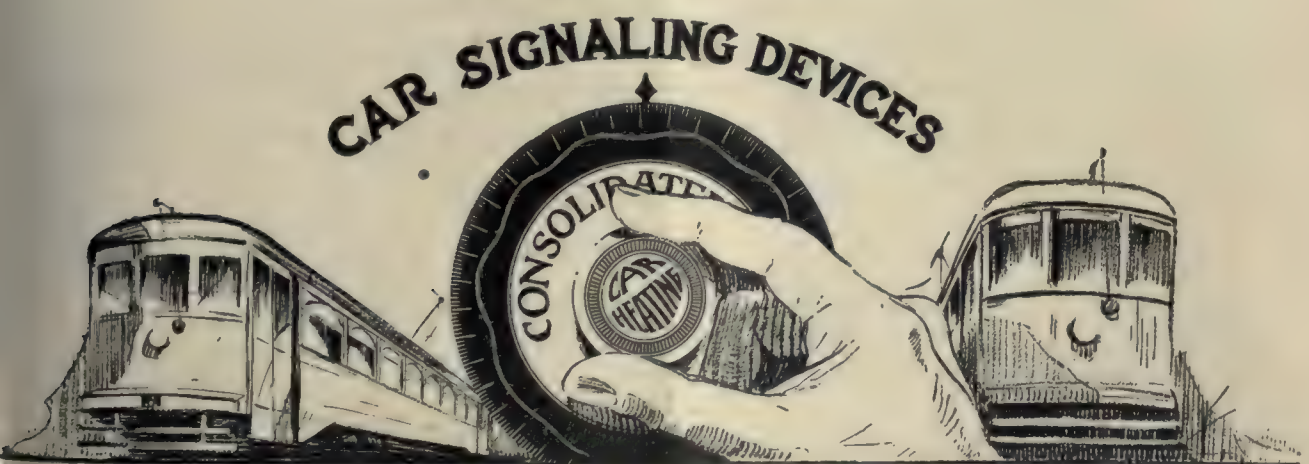
properly assembled, co-ordinated car-signaling system gives more satisfactory service, assures reliability, promotes efficiency and prevents delays. The motorman's signal light is especially helpful in preventing boarding and alighting accidents, because the doors must be entirely closed before the motorman gets the starting light. Call for Consolidated when specifying.

Station CCH now signing off until next week when it will be on the air with another interesting Consolidated program.

Good day!

**CONSOLIDATED**

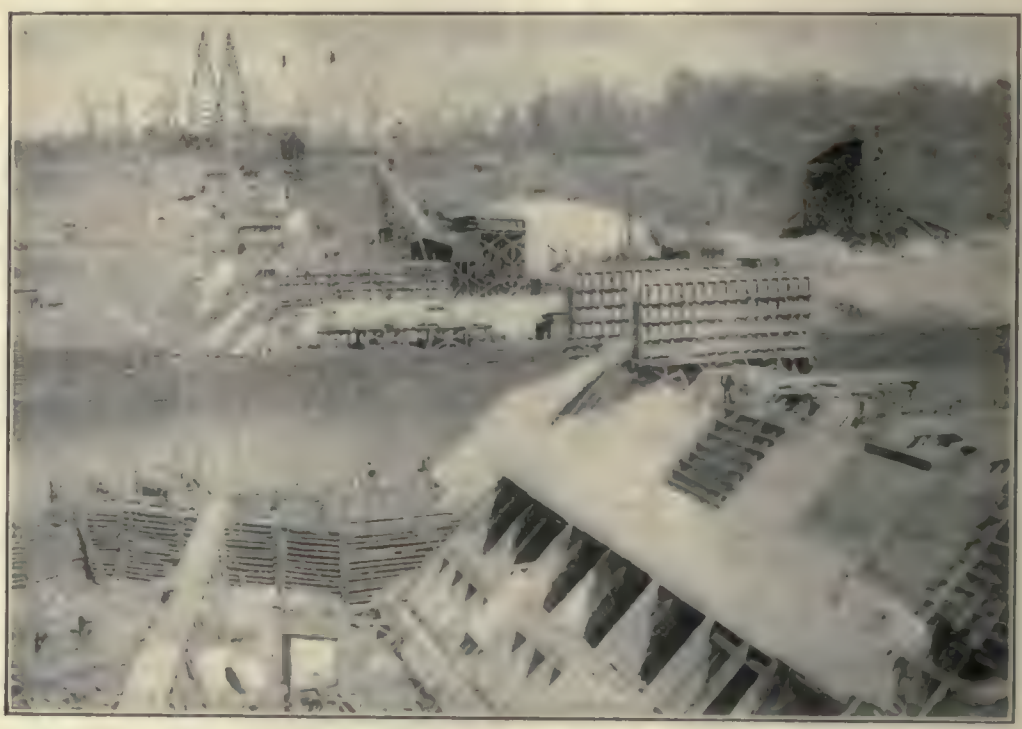
**CAR SIGNALING DEVICES**




**CONSOLIDATED CAR HEATING COMPANY**

ew York **ALBANY, N. Y.** Chicago

# Taking to the Country the Advantages of the City



Ford Bacon & Davis
*Engineers*

## Remmel Dam

Ambursen Construction Co
*Contractors*

on the Ouachita River, near Malvern, Arkansas
Arkansas Light and Power Co. Project

The above Dam and Power Station costing $1,600,000.00 is reinforced throughout with

## Laclede Rail Steel Bars

This is the first of three dams provided for in the ten year program costing approximately $18,000,000.00, and developing 120,000 hp. More than fifty cities and towns in Arkansas will be supplied with power from this project.

## LACLEDE STEEL CO.

*Steel Works*
Alton, Ill.
Madison, Ill.
East St. Louis, Ill.

*General Office*
Arcade Bldg.
St. Louis, Mo.

*District Offices*
Chicago, Ill.
Kansas City, Mo.
Detroit, Mich.

*Member of Rail Steel Products Assn.*

## Latest H-W Contributions to Motor Coach Comfort




EVERY year for 98 years Heywood-Wakefield has developed something new in seat building.

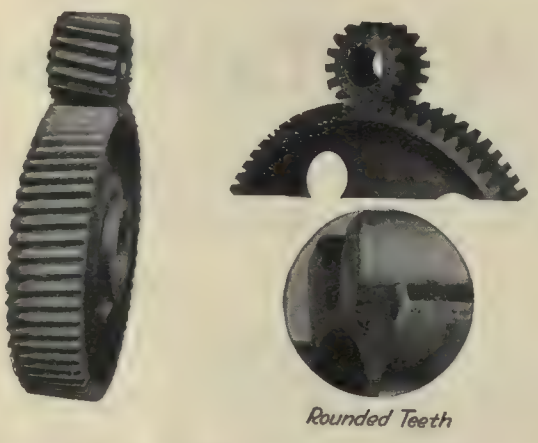
This year *comfort* is the paramount consideration in motor coach construction. So H-W designed the super-comfort bus seats shown here: the ***Tourease,*** a notable advance along previously approved lines; the ***Traveluxe,*** a veritable masterpiece in Motor Pullman luxury.

With the addition of these two new coach seats, the H-W line furnishes a special model for every kind of service from the long motor-bus tour to the short city haul of Fifth Avenue (New York) and Yellow (Chicago) Coach Companies. Your own judgment will dictate where you should begin the solution of your seating problems.

Consultation with our passenger-seating experts neither costs nor obligates you.

HEYWOOD-WAKEFIELD SALES OFFICES
HEYWOOD-WAKEFIELD CO.
1359 Railway Exchange Bldg., Chicago, Ill.
HEYWOOD-WAKEFIELD CO.
516 W 34th St., New York
HEYWOOD-WAKEFIELD CO.
Monadnock Bldg., San Francisco
F. N. GRIGG
630 Louisiana Ave., Washington, D. C.
THE G. F. COTTER SUPPLY CO.
Houston, Tex.
THE RAILWAY AND POWER ENGINEERING CORP'N
Montreal and Toronto, Canada

**Heywood-Wakefield**
REG. U.S. PAT. OFF.




**Nuttall Gears**
EVERY GEAR REGISTERED

*There isn't a bit of noise in a*

# Nuttall Gear

Nuttall Helical Gears are the most silent, easiest-operating, longest wearing and most economical gears made for traction service.

That's the whole story except that more and more of the leading traction companies are making Nuttall Gears standard equipment.

There are Nuttall Gears for every type of traction car, from the one-man safety to the large interurban express.

Examine a set of Nuttall Gears—see how the teeth are cut with rounded edges to facilitate easy installation and to prevent chipping and cutting—note also that there is no undercut at the tooth root where the greatest strength is required—Both of these minor details add materially to the life of the gears. After you see and study these gears in operation you will wonder why you haven't adopted Nuttall Helical Gears long ago.

*Get our gear book, it will tell you the whole story.*

**R.D. NUTTALL COMPANY**
**PITTSBURGH PENNSYLVANIA**

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

# *Mr. Railroad Man:—*

**YOU take a pride in your record for good service and few accidents.**

**WE are proud of the record for efficiency of our H-B LIFE GUARDS and PROVIDENCE FENDERS which enable you to give good service and prevent accidents.**

**In order that you may maintain your record in 1925**

INSIST UPON GETTING

## H-B LIFE GUARDS

***Manufactured by***

THE CONSOLIDATED CAR FENDER COMPANY

PROVIDENCE, R. I.

**Wendell & MacDuffie Co., Gen. Sales Agents**

**110 East 42nd St., New York City**



## *Here's a popular railroad type*

THIS INDUSTRIAL LOCOMOTIVE CRANE, 4-wheel car, gasoline power, is in use on many roads for general work, handling coal and all bulk materials with clamshell bucket and all unit lifts with hook and block. On the New York Central main lines sixteen of this type are in service, handling ashes from pit to cars. Its small size and low clearance makes it particularly valuable as a shop crane, because it can work freely inside buildings and in congested yards.

The many savings of time and labor effected by the installation of a small crane of this type is well worth considering. INDUSTRIAL engineers will gladly give you complete specifications upon request.

INDUSTRIAL WORKS, BAY CITY, MICH.



Compressors have "wafer" valves, water cooled cylinders, automatic lubrication and unloading devices, to economize power.

Gasoline types are direct connected to Buda, 4-cylinder, 4-cycle engines. Standard trucks have steel wheels, but trailer-type trucks with spring suspension and rubber tires may be had; also skid mountings.

Capacities, 100 cu. ft. and upward. Distinguished by power economy, and excellent wearing qualities, embodying the experience of 15 years in building portable air compressors.

# AIR POWER

## WHEN AND WHERE YOU NEED IT

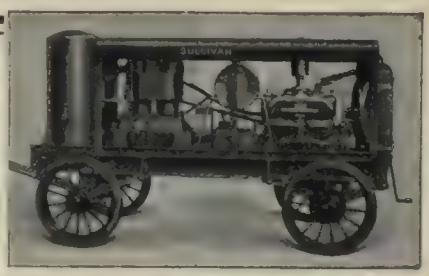
That's what a Sullivan portable compressor will give you, cutting time and labor costs on dozens of odd jobs in your construction and repair work, such as rock removal, breaking concrete, sand blast cleaning, painting, pumping water, calking mains, riveting or drilling steel work, etc.

Send for New Bulletin 3277-N

**Sullivan Machinery Company**
150 So. Michigan Ave., CHICAGO



"WK-34" Compressor, Fordson Driven



"WK-311," 170-ft. Compressor, on Trailer Truck, Rubber Tires.

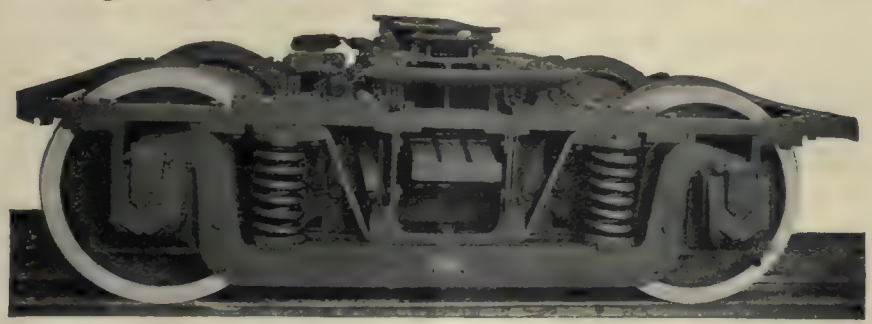


103-ft. "WK-311" Compressor, on Steel Wheel Truck.



"WK-32" Motor-Driven Compressor.

# *Japanese Electric Railways Are Using Many Types of Baldwin Motor Trucks*



**A New High Speed Interurban Truck Built for an American Railway**

ON a number of the electric urban and interurban railways in Japan, Baldwin Improved Motor Trucks have been in general use with good results. The truck illustrated is of the equalized Pedestal type, which has proved very satisfactory for high speed interurban work.

We design and manufacture electric motor trucks and trailer trucks to meet any particular requirements and are equipped to make deliveries promptly.

## THE BALDWIN LOCOMOTIVE WORKS

**PHILADELPHIA, U. S. A.** Cable Address "Baldwin, Philadelphia"

1367




## Drip Points for Added Efficiency

They prevent creeping moisture and quickly drain the petticoat in wet weather, keeping the inner area dry.

The Above Insulator—No. 72—Voltages—Test—Dry 64,000. Wet 31,400. Line 10,000.

Our engineers are always ready to help you on your glass insulator problem. Write for catalog.

**Hemingray Glass Company**
**Muncie, Ind.**
Est. 1848—Inc. 1870

AMERICAN ELECTRICAL WORKS · AMELECTRIC · Wires and Cables · PHILLIPSDALE, R.I.
Reg. U. S. Pat. Office
Incandescent Lamp Cord

## AMELECTRIC PRODUCTS

BARE COPPER WIRE AND CABLE
TROLLEY WIRE
WEATHERPROOF WIRE AND CABLE
PAPER INSULATED UNDERGROUND CABLE
MAGNET WIRE

**AMERICAN ELECTRICAL WORKS**
**PHILLIPSDALE, R. I.**
Boston, 176 Federal; Chicago, 112 W. Adams; Cincinnati, Traction Bldg.; New York, 100 E. 42nd St.

AIMCO



SEND TODAY
for our new Publication
on
SAFETY
and
EFFICIENCY
in Electric Railway Signals and Crossing Bells

American Insulating Machy. Co., Inc.
521 Huntingdon St., Philadelphia, Pa.



**PEIRCE**
**Railway Feeder Pins**
A strong Forged Steel Pin designed for heavy duty. Their low cost permits their use over the entire system.
HUBBARD & COMPANY
PITTSBURGH CHICAGO



STANDARD UNDERGROUND CABLE CO. TRADE MARK

THE mark of quality in electric wires and cables and cable accessories.

*Write our nearest branch office*

BOSTON NEW YORK PHILADELPHIA WASHINGTON PITTSBURGH CHICAGO ST. LOUIS DETROIT SAN FRANCISCO




**ELECTRICAL WIRES AND CABLES**
**John A. Roebling's Sons Company**
Trenton, New Jersey J-1707



**ANACONDA**
**TROLLEY WIRE**
ANACONDA COPPER MINING COMPANY
THE AMERICAN BRASS COMPANY
Conway Bldg., Chicago, Ill. General Offices, Waterbury, Conn.

TRADE MARK

*For dependable Line Material that will give you maximum service use*

**ANDERSON**

*Send for Latest Quotations*
Main Office and Factory, Boston, Mass.



**U. S. ELECTRIC AUTOMATIC SIGNAL**
for single track block signal protection
**United States Electric Signal Co.**
West Newton, Mass.

**Chapman Automatic Signals**
**Charles N. Wood Co., Boston**



**Shaw Lightning Arresters**
*Standard in the Electric Industries for 35 years*
**Henry M. Shaw**
*150 Coit St., Irvington, Newark, N. J.*

# American Rail Bonds

CROWN
UNITED STATES
TWIN TERMINAL
SOLDER
TRIPLEX

**Arc Weld and Flame Weld**

*Send for new Rail Bond Book*

**American Steel & Wire Company**
CHICAGO
NEW YORK







***The Principle that established solderless connectors as good engineering.***

The more contact surface you get in a connection—the better the joint.

Because the tapered sleeve of the Dossert Connector gave engineers a means for securing large contact area held permanently tight—the solderless connector idea met with favor

Today it is standard practice.

Write for the Dossert Catalog.

**Dossert & Company, New York**
242 West 41st Street
H. B. LOGAN, President

**DOSSERT Solderless Connectors**

# PAGE STRAND

## PAGE-ARMCO IRON STRAND

Page-Armco Strand is produced from Armco Ingot Iron (99.84% pure) free from segregations which would tend to invite corrosion.

The heavy galvanized coating of pure zinc on Page-Armco Strand combined with the purity of the wire insures maximum service.

## PAGE HIGH CARBON STEEL STRAND

Page Galvanized Steel Strand is made in the following grades:

Page Commercial Strand
Page Siemens-Martin Strand
Page High Strength Strand
Page Extra High Strength Strand

*It conforms to exacting specifications of A.B.R.A., N.E.L.A. A.R.A.*

**Page Steel & Wire Co.**
An Associate Company of the
AMERICAN CHAIN CO., INC.
BRIDGEPORT, CONNECTICUT, U. S. A.

District Sales Offices:
New York Pittsburgh Chicago
San Francisco

# THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

**Builders since 1868 of Water Tube Boilers of continuing reliability**

BRANCH OFFICES

BOSTON, 49 Federal Street
PHILADELPHIA, Packard Building
PITTSBURGH, Farmers Deposit Bank Building
CLEVELAND, Guardian Building
CHICAGO, Marquette Building
CINCINNATI, Traction Building
ATLANTA, Candler Building
PHOENIX, ARIZ., Heard Building
DALLAS, TEX., 2001 Magnolia Building
HONOLULU, H. T., Castle & Cooke Building
PORTLAND, ORE., 805 Gasco Building




WORKS

Bayonne, N. J.
Barberton, Ohio

**Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893**

BRANCH OFFICES

DETROIT, Ford Building
NEW ORLEANS, 521-5 Baronne Street
HOUSTON, TEXAS, Southern Pacific Building
DENVER, 435 Seventeenth Street
SALT LAKE CITY, 405-6 Kearns Building
SAN FRANCISCO, Sheldon Building
LOS ANGELES, 404-6 Central Building
SEATTLE, L. C. Smith Building
HAVANA, CUBA, Calle de Aguiar 104
SAN JUAN, PORTO RICO, Royal Bank Building

# Lorain Special Trackwork Girder Rails

*Electrically Welded Joints*

**THE LORAIN STEEL COMPANY**
Johnstown, Pa.

*Sales Offices:*
Atlanta · Chicago · Philadelphia · Cleveland · Pittsburgh · New York

*Pacific Coast Representative:*
United States Steel Products Company
Los Angeles · Portland · San Francisco · Seattle

*Export Representative:*
United States Steel Products Company, New York, N. Y.

**J-P Products of interest to Electric Railways**


NOARK Fuses


NOARK Fuse Clips CUTOUT BASES


NOARK Service and Underground Boxes


Railway and Mine Hangers and Insulators


J-P Molding Service (Covered Boxes)


VULCABESTON Sheet and Rope Packing

**JOHNS-PRATT CO. HARTFORD, CONN.**

# BUDA
ESTABLISHED 1881

Special Track Work of every description

**THE BUDA COMPANY**
Harvey (Suburb Chicago) Illinois

# High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS
COMPLETE LAYOUTS
IMPROVED ANTI-KICK BIG-HEEL SWITCHES
HARD CENTER AND MANGANESE CONSTRUCTION

**New York Switch & Crossing Co.**
Hoboken, N. J.

## SPECIALISTS

in the

**Design and Manufacture**

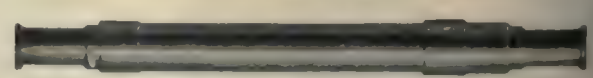
of

***Standard—Insulated—and Compromise Rail Joints***

**The Rail Joint Company**
61 Broadway, New York City

## Cambria Forged Steel Electric Car Axles

***To Meet Most Rigid Specifications***



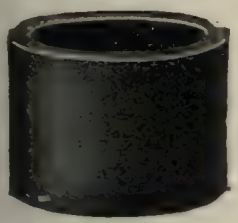
Other products for the electrical field includes wheels, armature shafts, rails, spikes, track work, splice bars, bolts, tie plates, tie rods, pole line material, sheets, magnet steel and gear blanks.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

# BETHLEHEM

## "Longwear" Pins and Bushings

*Hard—Accurate—Uniform*



Renewal Materials for Peckham and other Trucks

Castings—Forgings Springs

**E.G.Long Company**

50 Church Street, New York, N. Y.

THE WORLD'S STANDARD

## "IRVINGTON"

Black and Yellow
Varnished Silk, Varnished Cambric, Varnished Paper

Irr-O-Slot Insulation Flexible Varnished Tubing
Insulating Varnishes and Compounds

**Irvington Varnish & Insulator Co.**

Irvington, N. J.

*Sales Representatives in the Principal Cities*



TRUCK WITH TOWER IN RUNNING POSITION

## TRENTON TOWER

### This 3-Section

is not only more convenient, but stronger than the older type.

The top section is reinforced by the intermediate section. The 3-section design makes it possible to raise the platform 16 inches higher and drop it 12 inches lower than can be done with the old-style 2-section tower.

We'll gladly send you details.

**J. R. McCARDELL CO.**

Trenton, New Jersey, U. S. A.




THE large groove in Haviland Metal Car Rollers makes it particularly easy to attach the shade material, and holds it firmly. The rollers themselves are built to meet specification—and always to like hard service.

**HAVILAND SHADE ROLLER COMPANY**

380 Lafayette Street Incorporated New York City

**AUTOMATIC SIGNALS**

Highway Crossing Bells
Headway Recorders
Flasher Relays

NACHOD SIGNAL COMPANY, INC.
LOUISVILLE, KENTUCKY



FERALITE

**ALUMINO-THERMIC JOINTS**

New and independent process. No inserts needed. Up-to-date and economical.

**Alumino-Thermic Corp., Roselle Park, N. J.**

**ECONOMIZERS**

reduce fuel costs by making use of waste exhaust gases to preheat the boiler feed. Patented construction proven by 20 years of service.

# FOSTER

**SUPERHEATERS**

improve engine, turbine and boiler economy by enabling a given amount of steam to do more work. Over 10,000 installations in stationary power plants.

**POWER SPECIALTY CO.,** Boston, Phila., Pitts., Detroit, Kans. City, Chicago, San Fran., Los Angeles, Boulder, Dallas, London 111 Broadway, NEW YORK

PERFECT
MICANITE
INSULATOR
Reg. U. S. Pat. Off.

ELECTRICAL INSULATION

Micanite armature and commutator insulation, commutator segments and rings, plate, tubes, etc., Empire oiled insulating materials; Linotape; Kablak; Mico; and other products—for the electrical insulating requirements of the railway.

*Catalogs will gladly be furnished*

MICA INSULATOR COMPANY
*Sole Manufacturers of Micanite*
*Established* 1893
68 Church St., New York 542 So. Dearborn St., Chicago
Works: Schenectady, N. Y.
E-F

'CARNEGIE'
for
WHEELS
AXLES
RAILS
CROSS TIES

Carnegie Steel Company
PITTSBURGH, PENNA.

ALLIS-CHALMERS
MILWAUKEE, WIS. U. S. A.
Electrical Machinery, Steam Turbines, Steam Engines, Condensers, Gas and Oil Engines, Air Compressors, Air Brakes

RAMAPO AJAX CORPORATION
Ramapo Automatic Return Switch Stands for Passing Sidings
RACOR
TRADE MARK
RACOR Tee Rail Special Work
Manganese Construction
GENERAL OFFICES: HILBURN, NEW YORK
Chicago New York Superior, Wis. Niagara Falls, N. Y.
Canadian Ramapo Iron Works, Ltd., Niagara Falls, Ont.

B. A. HEGEMAN, Jr., President C. C. CASTLE, First Vice-President
H. A. HEGEMAN, Vice-Pres. and Treas. F. T. SARGENT, Secretary
W. C. PETERS, Manager Sales and Engineering
National Railway Appliance Co.
Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., New York
Munsey Bldg., Washington, D. C. 100 Boylston St., Boston, Mass.
Hegeman-Castle Corporation, Railway Exchange Building, Chicago.
RAILWAY SUPPLIES
Tool Steel Gears and Pinions
Bell Locked Fare Box and Change Maker
The Aluminum Field Coils
Walter Tractor Snow Plows
Cutler-Hammer Electric Heaters
Pittsburgh Forge & Iron Co.'s Products
Genesco Paint Oils
E. K. Car Control Corporation's Safety Devices
Garland Ventilators
Flaxlinum Insulation
Yellow Coach Mfg. Co.'s Single and Double Deck Busses
Economy Electric Devices Co.'s Power Saving and Inspection Meters
Anglo-American Varnish Co Varnishes, Enamels, etc.
Gilmer Multiple Safety Step Treads
National Hand Holds
Ft. Pitt Spring & Mfg. Co., Springs
Turnstile Car Corporation's Turnstiles
Anderson Slack Adjusters
Feasible Drop Brake Staffs
Dunham Hopper Door Device

A Single Segment or a Complete Commutator
is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.
Cameron Electrical Mfg. Co., Ansonia, Connecticut

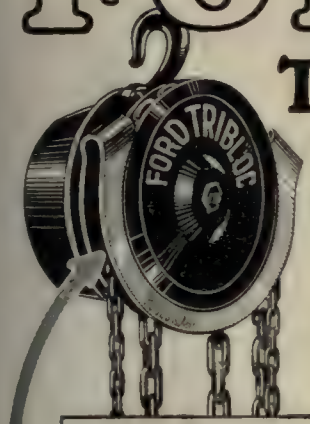
ERICO BONDS
THE ELECTRIC RAILWAY IMPROVEMENT CO.
CLEVELAND, OHIO

We are prepared
to handle any high grade proposition where
VARNISHED CAMBRIC
Wires and Cables
are required.
When using *quality* Wires and Cables use *quality* Tapes.
"MANSON" Tape, "OKONITE" Tape, "DUNDEE" Tapes.
THE OKONITE CO., Passaic, N. J.
Incorporated 1884
OKONITE
TRADE MARK
*Sales Offices: New York—Atlanta—Pittsburgh—San Francisco.*
*Agents:* Central Electric Co., Chicago, Ill. Pettingell-Andrews Co., Boston, Mass.; The F. D. Lawrence Electric Co., Cincinnati, Ohio; Novelty Electric Co., Philadelphia, Pa.
*Canadian Representatives:* Engineering Materials Limited, Montreal.

NEW and RELAYING RAILS
1 TON OR 1000
TRACK EQUIPMENT
L. B. FOSTER CO.
RAIL ACCESSORIES
PITTSBURGH - PENNSYLVANIA
NEW YORK · JERSEY CITY · PHILADELPHIA · HAMILTON, O.

*Only reliable products can be continuously advertised*

# FORD TRIBLOC




Look for the *Green* Loop Guide

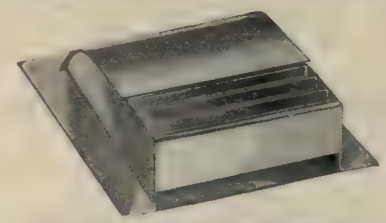
**For the car shop**

A quick, easy, but sure method of speeding up work in the car shop—and keeping your rolling stock on the road where it will bring in revenue—is to provide your men with Triblocs on the many lifting jobs inseparable from car shop work.

*Send for Catalog 6-B*

FORD CHAIN BLOCK COMPANY
2nd and Diamond Streets, Philadelphia, Pa.

**CHAIN HOISTS**



N-L Type "C" Arch Roof Ventilator

# Stuffy Cars
## Empty Fare Boxes

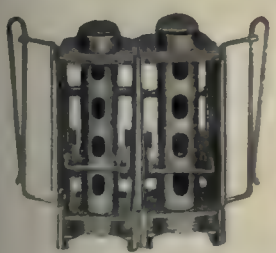
Many people simply will not ride in poorly ventilated cars. Why not encourage them to ride by making the cars comfortable? N-L Ventilators make it possible to keep them amply warm yet perfectly ventilated. They change all the air in the car many times an hour. They are weatherproof, dustproof, draftproof, silent—and good looking.

**Ask for a copy of *"Superior Ventilation."***
**It explains all.**

**The Nichols-Lintern Co.**
7960 Lorain Ave., Cleveland, Ohio
Canadian Representative:
Railway & Power Eng. Corp., Ltd., Toronto, Ontario

N-L

# JOHNSON Universal Changer



**Adjustable**

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

**Flexible**

Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

**JOHNSON FARE BOX COMPANY**
Ravenswood, Chicago, Ill.




Type R-11
Double Register

## International Registers

Made in single and double types to meet requirements of service. For hand or foot, mechanical or electric operation. Counters, car fittings, conductors' punches.

Exclusive selling agents for HEEREN ENAMEL BADGES.

**The International Register Co.**
15 South Throop Street, Chicago, Illinois




**Direct Automatic Registration By the Passengers**

Rooke Automatic Register Co.
Providence, R. I.



*Gets Every Fare*
PEREY TURNSTILES or PASSIMETERS

Use them in your Prepayment Areas and Street Cars

**Perey Manufacturing Co., Inc.**
101 Park Avenue, New York City



The Zone System of Fares is Successfully Collected with the Aid of

# CLEVELAND FARE BOXES

*Let Us Give You Particulars*

**The Cleveland Fare Box Co.**
Cleveland, Ohio

Canadian Cleveland Fare Box Co., Ltd.,
Preston, Ont.

Coin Counting and Sorting Machines. Change Carriers

# BRAKE SHOES

## AERA Standards
## Brake Heads



Diamond "S" Steel Back and Lug Shoes best for all equipment.

Manufactured and sold under U. S. Patent and Registered Trade Mark.

**American Brake Shoe and Foundry Co.**
**30 Church Street, New York**
332 So. Michigan Ave., Chicago



# Cold Dinners

for *your* passengers?

Not if you use

## AJAX
## BABBITT *for* ARMATURES

***keeps the rolling stock rolling***



## The Ajax Metal Company
Established 1880
PHILADELPHIA

NEW YORK CHICAGO BOSTON CLEVELAND

*Youre having brush trouble*

CORRECT IT
USE LE CARBONE CARBON BRUSHES

*They talk for themselves*

COST MORE PER BRUSH
COST LESS PER CAR MILE

W. J. Jeandron
345 Madison Avenue, New York
Pittsburgh Office: 634 Wabash Bldg.
Chicago Office: 1657 Monadnock Block
San Francisco Office: 525 Market Street
Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal and Toronto

**Clip time—clip costs with the**
## FLOWER BRUSH HOLDER
***Reversible—Replaceable Box***

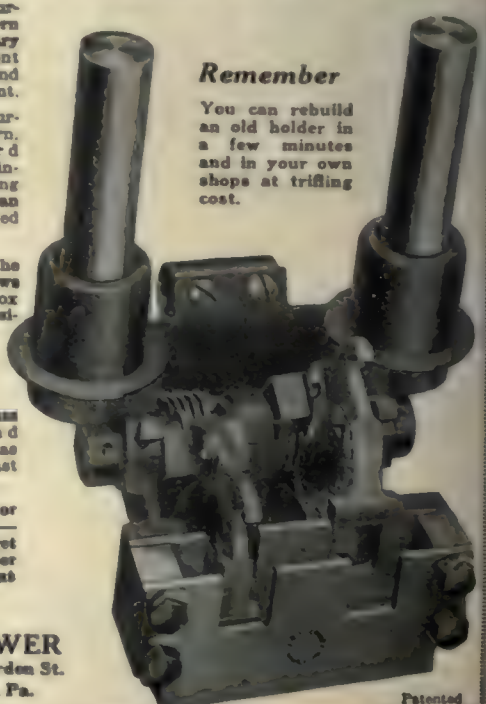
To start with this box is made of rolled plate which of course wears longer than the softer cast metal.

When inner surfaces have worn it is necessary only to put front plate in rear and rear plate in front.

When all four surfaces are worn, new standard parts are obtainable at trifling cost,—a stock can easily be carried at all times.

What's more the four cap screws that bind the box together are positively secured against loosening by a special form of soft brass locking band washer. Just as secure as a cast box.

Write now for further details,—or better still get a Flower Holder and try it out yourself.



***Remember***

You can rebuild an old holder in a few minutes and in your own shops at trifling cost.

Patented Sept. 2, 1924

**D. B. FLOWER**
1217 Spring Garden St.
Philadelphia, Pa.

# HALE-KILBURN
## CAR SEATS
*For Every Class of Service*

General Offices and Works: Philadelphia
Offices: New York, Chicago, St. Louis, Washington, San Francisco

PANELYTE

HEADLININGS
THE PANELYTE COMPANY, Trenton, N. J.

# GALVANIZING
## HOT DIP

We have the largest jobbing galvanizing plant and kettles in the United States. We guarantee our galvanizing to stand eight one minute dips in the Standard Copper Sulphate Solution Test. *Galvanized Products furnished.*

JOSEPH P. CATTIE & BROTHERS
Gaul and Letterly Sts., Philadelphia, Penna.

RAILWAY UTILITY COMPANY
CAR COMFORT WITH
UTILITY
HEATERS
REGULATORS
VENTILATORS
141-151 West 22d St. Chicago, Ill. — *Write for Catalogue* — 1323 Broadway New York, N. Y.

# HASKELITE
It is economy to use Haskelite roofs and Plymetl girder panels. Headlinings and inside linings under the windows can be eliminated. Car builders are doing this. You not alone save money in first cost but your customer saves money in operating cost due to lighter weight cars.

Blueprint booklet furnished upon request.

HASKELITE MANUFACTURING CORPORATION
*133 W. Washington Street, Chicago, Ill.*

THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



No. 478E

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.

The Most Successful Men in the Electric Railway Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week



*"Differential Two-Car Train. Trailer dumping load clear of trench."*

# DIFFERENTIAL CARS
## Standard on Fifty Railways for

| | |
|---|---|
| Track Maintenance | Track Construction |
| Ash Disposal | Hauling Crossties |
| Placing Ballast | Disposal of Waste |
| Coal Hauling | Snow Disposal |

Concrete Materials to the Job
Excavated Material to the Dump

*For Economy*

THE CLARK CONCRETE BREAKER
THE DIFFERENTIAL BOTTOM DUMP CAR
THE DIFFERENTIAL COMBINATION CAR-WHEEL TRUCK and TRACTOR

THE DIFFERENTIAL STEEL CAR CO.
Findlay, Ohio, U. S. A.

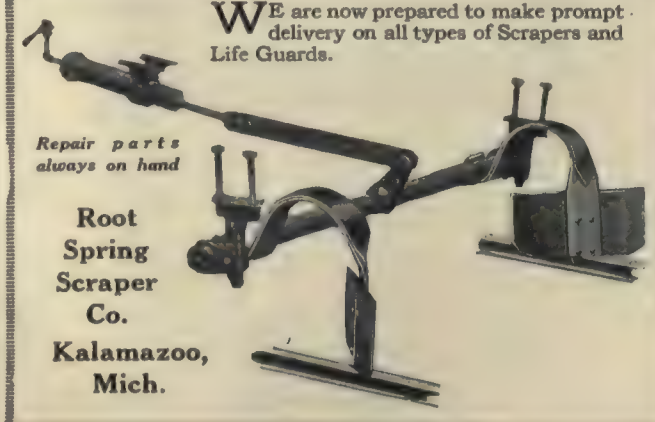
TULC
A LUBRICANT

We make a specialty of
# ELECTRIC RAILWAY LUBRICATION
We solicit a test of TULC on your equipment

The Universal Lubricating Co.
Cleveland, Ohio
Tulc, Inc., Eastern Representative,
1617 Gotham National Bank Bldg., New York City

WE are now prepared to make prompt delivery on all types of Scrapers and Life Guards.

*Repair parts always on hand*



Root Spring Scraper Co.
Kalamazoo, Mich.



## Complete satisfaction

Operating perfectly and requiring minimum attention for maintenance and lubrication, Earll Catchers and Retrievers give genuinely satisfactory results. Their refinement of design, and mechanical superiority are summarized in the following five features, peculiar to Earll construction.

**No-wear Check Pawl**
**Free-Winding Tension Spring**
**Ratchet Wind**
**Emergency Release**
**Perfect Automatic Lubrication**

Earll Catchers and Retrievers

**C. I. EARLL, York, Pa.**

## Play for safety—

*plus resiliency—*
*plus long life*

*By specifying*

## FORT PITT SPRINGS

FORT PITT SPRING & MFG. CO.
Pittsburgh, Pa.





PS HEATERS

## Car Heating and Ventilation

are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

**The Peter Smith Heater Company**
6209 Hamilton Ave., Detroit, Mich.

**SAMSON SPOT WATERPROOFED TROLLEY CORD**



Trade Mark Reg. U. S. Pat. Off.
Made of extra quality stock firmly braided and smoothly finished. Carefully inspected and guaranteed free from flaws. Samples and information gladly sent.

**SAMSON CORDAGE WORKS, BOSTON, MASS.**

## The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



**THE STAR BRASS WORKS**
KALAMAZOO, MICH., U. S. A.

## HORNE & EBLING CORPORATION

50 CHURCH ST., NEW YORK, N. Y.

Brass Hardware For Cars and Buses

Motor and Controller Parts

HORNE & EBLING

Sterling Trolley Bases and Brakes

Mall. Iron and Brass Castings

100 New Users in the Last Nine Months
## KASS SAFETY TREADS
HIGH
in efficiency and lasting qualities
LOW
in weight, initial and upkeep costs
Morton Manufacturing Co., Chicago

## Waterproofed Trolley Cord




Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

**FOR POSITIVE SATISFACTION ORDER SILVER LAKE**

If you are not familiar with the quality you will be surprised at its **ENDURANCE** and **ECONOMY.**

***Sold by Net Weights and Full Lengths***

**SILVER LAKE COMPANY**
*Manufacturers of bell, signal and other cords.*
**Newtonville, Massachusetts**

## Only Reliable Products Can be Continuously Advertised

# SEARCHLIGHT SECTION

## USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD:

*Positions Wanted*, 4 cents a word, minimum 75 cents an insertion, payable in advance.

*Positions Vacant* and all other classifications, 8 cents a word, minimum charge $2.00.

*Proposals*, 40 cents a line an insertion.

INFORMATION:

*Box Numbers* in care of any of our offices count 10 words additional in undisplayed ads.

*Discount* of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 to 3 inches.....$4.50 an inch
4 to 7 inches..... 4.30 an inch
8 to 14 inches..... 4.10 an inch

Rates for larger spaces, or yearly rates, on request.

*An advertising inch* is measured vertically on one column, 3 columns—30 inches—to a page.

M.F.J.

### POSITIONS WANTED

AUDITOR, broad and thorough experience in financing and accounting; all branches railway, electric and gas utilities, open for engagement. Possess initiative and capable of assuming full control of all accounting matters. PW-758, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

COMPETENT, experienced executive, thoroughly familiar with all details of bus maintenance and operation, open for immediate connection. Over six years' experience with largest and most successful properties, invites investigation of past efforts. PW-762, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

EXECUTIVE, nine years manager of local street railway system in industrial town seeks larger opportunity. Thirteen years' prior experience in engineering, transportation and executive departments of large trunk line railroad. Has given special study to analyzing transportation problems and operating costs. PW-761, Electric Railway Journal, Real Estate Trust Bldg., Philadelphia, Pa.

MR. MANAGER, are you in the field for a superintendent of equipment or master mechanic. If so you should realize that practical experience is an important factor in successful handling of this department. 15 years in the railway field, installation, maintenance and operation. PW-763, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa.

SUPERINTENDENT—City or interurban; twelve years' successful experience in maintenance, operation and public relations. PW-757, Electric Railway Journal, 10th Ave. at 36th St., New York.

TRAFFIC and transportation superintendent—Experienced interurban and city railway and bus operation, desire to connect with organization inaugurating bus service. PW-759, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.


**FOR SALE** Standard Gauge Electric Railway Equipment

1—Parlor Chair Car, built by American Car Company, length 48-ft.—seating capacity 40—fully equipped air brakes, electric heating system. Brill standard double trucks, 65-hp. motors. Type M Controller.

6—Interurban Passenger Cars, built by American Car Company, length of cars 49-ft., seating capacity 50, fully equipped air brakes. Electrical equipment 4 G.E.—67—40-hp. motors and K-6 controllers. Smith heaters and Brill standard double trucks.

1—Express Car built by American Car Company, length 50-ft., equipped with air brakes, stove heat. Brill standard double trucks. Electrical equipment 4 G.E.—67—40-hp. motor and K-28 controller.

1—Line Car, 24-ft. long, Electrical equipment consists of 2 G.E.—1000—35-hp. motors and K-10 controller.

Cars in splendid condition, finished in both rattan and plush. For quick sale, we offer these Cars at $3000 each, f.o.b. cars. Write at once for detailed specifications. Located in Chicago District. Inspection invited.

**HYMAN-MICHAELS COMPANY**

*Rails, Locomotives and Cars*

Main Office—CHICAGO—Peoples Gas Bldg.

District Offices: New York, Pittsburgh, St. Louis, San Francisco

**RAILS**

New Relaying

1 TON = 1000

FROGS
SWITCHES
SPLICE BARS
BOLTS
NUTS
TIE PLATES
RAIL
BRACES

All Rails and Track Materials shipped subject to inspection and approval at destination.

**L. B. Foster Co.**

PITTSBURGH-PA
NEW YORK

OLBEC

FOR SALE

**Two Single Truck Snow Sweepers**

Complete
Ready for operation
Splendid condition

**Transit Equipment Co.**

Cars — Motors
501 Fifth Avenue, New York

WE WANT TO BUY
30—West. 306-C.V.-4
**MOTORS**
Have you any to offer?
ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

WANTED
Order for Oak, Car Stock, Cross Ties, Switch Ties, Timber. Have four mills in operation. A good stand of timber, grades guaranteed. Prices right. Let's get acquainted.
ENARC LUMBER MFG. CO.
411 Aouw Bldg., Little Rock, Ark.

SEARCHLIGHT SERVICE SECURES SATISFACTORY SALES



*In the SEARCHLIGHT SECTION there is something of interest for Every Reader*

***Different Each Week***

The business wants of concerns and individuals are varied and always changing. Each day brings new wants; each day finds others filled.

**The SEARCHLIGHT SECTION**

of this paper advertises the business wants of the organizations and men in this field. As their wants change, so do the "Searchlight" ads.

For Every Business Want
Think "SEARCHLIGHT" First

G-20

# WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

**Advertising, Street Car**
Collier, Inc., Barron G.

**Air Receivers & Aftercoolers**
Ingersoll-Rand Co.

**Anchors, Guy**
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

**Armature Shop Tools**
Elec. Service Supplies Co.

**Automatic Return Switch Stands**
Ramapo Ajax Corp

**Automatic Safety Switch Stands**
Ramapo Ajax Corp.

**Axles**
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Johnson & Co., J. B.
St. Louis Car Co.

**Axles, Steel**
Carnegie Steel Co.
Laclede Steel Co.

**Babbitt Metal**
Ajax Metal Co.

**Badges and Buttons**
Elec. Service Supplies Co.
Int. Register Co., The

**Bearings and Bearing Metals**
Ajax Metal Co.
Bemis Car Truck Co.
General Electric Co.
More-Jones Brass & Metal Co.
St. Louis Car Co.
Westinghouse E. & M. Co

**Bearings, Center and Roller Side**
Baldwin Locomotive Wks.
Stucki Co., A.

**Bells and Gongs**
Brill Co., The J. G.
Elec. Service Supplies Co.
St. Louis Car Co.

**Bollers**
Babcock & Wilcox Co.

**Bond Testers**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.

**Bonding Apparatus**
Amer. Steel & Wire Co.
Electric Railway Impt. Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Track-work Co.

**Bonds, Rail**
Electric Railway Impt. Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Page Steel & Wire Co.
Railway Track-work Co.
Westinghouse E. & M. Co.

**Boxes, Switch**
Johns-Pratt Co.

**Brackets and Cross Arms (See also Poles, Ties, Posts, etc.)**
American Bridge Co.
Bates Expanded Steel Truss Co.
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

**Brake Adjusters**
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.

**Brake Shoes**
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.

**Brakes, Brake Systems and Brake Parts**
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
General Electric Co.
National Brake Co.
St. Louis Car Co.
Safety Car Devices Co.

**Brushes, Carbon**
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Westinghouse E. & M. Co.

**Brush Holders**
D. B. Flower

**Brushes, Wire, Pneumatic**
Ingersoll-Rand Co.

**Bulkheads**
Haskelite Mfg. Co.

**Buses, Motor**
Brill Co., The J. G.
Garford Motor Truck Co.
International Motor Co.
N. Y. Transportation Co.
St. Louis Car Co.

**Bus Seats**
Hale-Kilburn Co.
Heywood-Wakefield Co.

**Bushings, Case Hardened and Manganese**
Bemis Car Truck Co.
Brill Co., The J. G.
Forg Co., E. G.
St. Louis Car Co.

**Cables (See Wires and Cables)**

**Cambric Tapes, Yellow and Black Varnished**
Irvington Varnish & Ins. Co.
Mica Insulator Co.

**Carbon Brushes (See Brushes, Carbon)**

**Car Panel Safety Switches**
Westinghouse E. & M. Co.

**Cars, Dump**
Differential Steel Car Co.
St. Louis Car Co.

**Car Lighting Fixtures**
Elec. Service Supplies Co.

**Car Panel Safety Switches**
Consolidated Car Heat'g Co.
Westinghouse E. & M. Co.

**Cars, Passenger, Freight, Express, etc.**
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

**Cars, Gas Rail**
St. Louis Car Co.

**Cars, Self-Propelled**
General Electric Co.

**Car Wheels, Rolled Steel**
Bethlehem Steel Co.

**Castings, Brass, Composition or Copper**
Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.
More-Jones Brass & Metal Co.

**Castings, Gray Iron and Steel**
Bemis Car Truck Co.
St. Louis Car Co.

**Castings, Malleable and Brass**
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
St. Louis Car Co.

**Catchers and Retrievers, Trolley**
Earll, C. I.
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

**Catenary Construction**
Archbold-Brady Co.

**Change Carriers**
Cleveland Fare Box Co.

**Circuit-Breakers**
Anderson, A. & J. M., Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Clamps and Connectors for Wires and Cables**
Dossert & Co.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co
General Electric Co
Hubbard & Co
Ohio Brass Co
Westinghouse E. & M. Co.

**Cleaners and Scrapers, Track (See also Snow-Plows, Sweepers and Brooms)**
Brill Co., The J. G.
Root Spring Scraper Co.
St. Louis Car Co.

**Clusters and Sockets**
General Electric Co.

**Coal and Ash Handling (See Conveying and Hoisting Machinery)**

**Coil Banding and Winding Machines**
Elec. Service Supplies Co.

**Coils, Armature and Field**
General Electric Co.
Westinghouse E. & M. Co.

**Coils, Choke and Kicking**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

**Coin Counting Machines**
Cleveland Fare Box Co.
Intern'l Register Co.
Johnson Fare Box Co.

**Coin Sorting Machines**
Cleveland Fare Box Co.

**Coin Wrappers**
Cleveland Fare Box Co.

**Commutator Slotters**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

**Commutator Truing Devices**
General Electric Co.

**Commutators or Parts**
Cameron Elec'l Mfg. Co.
General Electric Co.
Mica Insulator Co.
Westinghouse E. & M. Co

**Compressors, Air**
General Electric Co.
Ingersoll-Rand Co.
Sullivan Machinery Co.
Westinghouse Tr. Br. Co.

**Compressors, Air Portable**
Ingersoll-Rand Co
Sullivan Machinery Co.

**Compressors, Gas**
Sullivan Machinery Co.

**Concrete Reinforcing Bars**
Laclede Steel Co.

**Condensers**
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.

**Condenser Papers**
Irvington Varnish & Ins. Co.

**Connectors, Solderless**
Dossert & Co
Westinghouse E. & M. Co.

**Connectors, Trailer Car**
Elec. Service Supplies Co.
Ohio Brass Co.

**Controllers or Parts**
General Electric Co.
Westinghouse E. & M. Co.

**Controller Regulators**
Elec. Service Supplies Co.

**Controlling Systems**
General Electric Co.
Westinghouse E. & M. Co.

**Converters, Rotary**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Conveying and Hoisting Machinery**
Columbia M. W. & M. I. Co

**Copper Wire**
Anaconda Copper Mining Co.
Page Steel & Wire Co

**Cord, Bell, Trolley, Register**
Brill Co., The J. G.
Elec. Service Supplies Co.
Internat'l Register Co., The
Roebling's Sons Co., J. A
St. Louis Car Co.
Samson Cordage Works
Silver Lake Co.

**Cord Connectors and Couplers**
Elec. Service Supplies Co
Samson Cordage Works
Wood Co., Chas. N.

**Couplers, Car**
Brill Co., The J. G.
Ohio Brass Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.

**Cranes**
Allis-Chalmers Mfg. Co.
Industrial Works

**Cranes, Gas or Electric**
Industrial Works

**Cranes, Locomotive, Motor Truck & Portable**
Industrial Works

**Cross Arms (See Brackets)**

**Crossing Foundations**
International Steel Tie Co

**Crossings**
Ramapo Ajax Corp.

**Crossing Signals (See Signals, Crossing)**

**Crossing, Frog & Switch**
Ramapo Ajax Corp.

**Crossing Manganese**
Bethlehem Steel Co.
Ramapo Ajax Corp.

**Crossings, Track (See Track, Special Work)**

**Crossings, Trolley**
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.

**Curtains and Curtain Fixtures**
Brill Co., The J. G.
Elec. Service Supplies Co
Morton Mfg. Co.
St Louis Car Co.

**Dealer's Machinery**
Elec. Equipment Co.
Hyman-Michaels Co.
Transit Equip. Co

**Derailing Devices (See also Track Work)**
Wharton, Jr., & Co., Wm.

**Derailing Switches, Tee Rail**
Ramapo Ajax Corp.

**Detective Service**
Wish-Service, P. Edward

**Doors & Door Fixtures**
Hale-Kilburn Co
St. Louis Car Co.

**Door Operating Devices**
Brill Co., The J. G.
General Electric Co.
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.

**Doors, Folding Vestibule**
Nat'l Pneumatic Co., Inc.

**Drills, Rock**
Sullivan Machinery Co.

**Drills, Track**
Amer. Steel & Wire Co.
Elec. Service Sup. Co.
Ingersoll-Rand Co.
Ohio Brass Co.

**Dryers, Sand**
Elec. Service Supplies Co.

**Ears**
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.

**Economizers**
Power Specialty Co.

**Electrical Wires and Cables**
Amer Electrical Works
Roebling's Sons & Co., J. A

**Electric Grinders**
Railway Track-work Co.
Rail Welding & Bonding Co.

**Electrodes, Carbon**
Railway Track-work Co.

**Electrodes, Steel**
Railway Track-work Co.

**Engineers, Consulting, Contracting and Operating**
Allison & Co., J. S.
Archbold-Brady Co.
Beeler, John A.
Bibbins J Rowland
Buchanan & Layng Corp.
Bureau of Comm. Economics, Inc
Day & Zimmermann, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelly, Cooke & Co.
Ong, Joe R.
Railway Audit & Inspection Co
Richey, Albert S.
Robinson & Co., D. P.
Sanderson & Porter
Stevens & Wood, Inc.
Stone & Webster
White Eng. Corp., The J. G

**Engines, Gas, Oil or Steam**
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse E & M. Co.

**Exterior Side Panels**
Haskelite Mfg. Co.

**Fare Boxes**
Cleveland Fare Box Co.
Johnson Fare Box Co.
Nat'l Ry. Appliance Co.

**Fences, Woven Wire and Fence Posts**
Amer. Steel & Wire Co.

**Fenders and Wheel Guards**
Brill Co., The J. G.
Consolidated Car Fender Co.
Elec. Service Supplies Co.
Root Spring Scraper Co.
St. Louis Car Co.
Star Brass Works

**Fibre and Fibre Tubing**
Westinghouse E. & M. Co.

**Field Coils (See Coils)**

**Flaxlinum Insulation**
Nat'l Ry. Appliance Co.

**Floodlights**
Elec. Service Supplies Co

**Frogs & Crossings, Tee Rail**
Bethlehem Steel Co.
Ramapo Ajax Corp

**Frogs, Track (See Track Work)**

**Frogs, Trolley**
Anderson Mfg. Co., A. & J. M
Ohio Brass Co.

**Fuses, Cartridge, Non-Refillable and High Voltage**
Johns-Pratt Co

**Fuses, Cartridge, Refillable**
Johns-Pratt Co.

**Fuses and Fuse Boxes**
General Electric Co
Westinghouse E. & M. Co.

**Fuses, Refillable**
General Electric Co.

**Galvanizers, Hot Dip**
Jos. P Cattie & Bros.

**Gaskets**
Westinghouse Tr. Br. Co.

**Gas-Electric Cars**
General Electric Co.

**Gas Producers**
Westinghouse E. & M. Co.

**Gates, Car**
Brill Co., The J. G.
St. Louis Car Co.

**Gear Blanks**
Bethlehem Steel Co.

**Gear Cases**
Chillingworth Mfg. Co.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

**Gears and Pinions**
Bemis Car Truck Co.
Bethlehem Steel Co.
Elec. Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

**Generating Sets, Gas-Electric**
General Electric Co.

**Generators**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Girder Rails**
Bethlehem Steel Co.
Lorain Steel Co.

**Gong (See Bells and Gongs)**

**Greases (See Lubricants)**

**Grinders and Grind. Supplies**
Railway Track-work Co

**Grinders, Portable**
Buda Company
Railway Track-work Co.

**Grinders, Portable Electric**
Railway Track-work Co.

**Grinding Blocks and Wheels**
Railway Track-work Co

**Ground Wires**
Page Steel & Wire Co.

**Guard Rail Clamps**
Ramapo Ajax Corp.

**Guard Rails, Tee Rail & Manganese**
Ramapo Ajax Corp.

**Guards, Trolley**
Elec. Service Sup. Co.
Ohio Brass Co.

**Hammers, Pneumatic**
Ingersoll-Rand Co.

**Harps, Trolley**
Elec. Service Supplies Co.
More-Jones Brass & Metal Co
Nuttall Co., R. D. & Co.
Star Brass Works

**Headlights**
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.

**Headlining**
Haskelite Mfg. Co.
Panelyte Co.

**Heaters, Bus**
N. A. Petry Co., Inc.

**Heaters, Car (Electric)**
Gold Car Heat. & Light. Co.
Nat'l Ry. Appliance Co.
Smith Heater Co., Peter

**Heaters, Car, Hot Air and Water**
Elec. Service Sup. Co.
Smith Heater Co., Peter

**Heaters for Special Purposes**
Power Specialty Co.

**Helmets—Welding**
Railway Track-work Co.

**Hoists & Lifts**
Ford Chain Block Co.

**Hoists, Portable**
Ingersoll-Rand Co.
Sullivan Machinery Co

**Hydraulic Machinery**
Allis-Chalmers Mfg. Co.

**Instruments, Measuring, Testing and Recording**
Elec. Service Sup. Co.
General Electric Co
Westinghouse E. & M. Co.

**Insulating Cloth, Paper and Tape**
General Electric Co
Irvington Varnish & Ins. Co
Mica Insulator Co.
Okonite Co
Stand. Underground Cable Co.
Westinghouse E. & M. Co.

**Insulating Silk**
Irvington Varnish & Ins. Co.

**Insulating Varnishes**
Irvington Varnish & Ins Co

**Insulation (See also Paints)**
Electric Ry Equipment Co.
Electric Service Sup. Co

# Pneumatic Tie Tampers



Labor-aiding tools that enable a small gang to equal the work output of two to three times the same number of men working by hand. Pneumatic tampers also make a uniform, smooth and firm track that stands up twice as long as that tamped by hand.

Ask for actual performance reports on the savings made by pneumatic tamping methods and other labor-saving air tools in track work.

## INGERSOLL-RAND COMPANY

**11 Broadway, New York**

*Offices in all principal domestic and foreign cities*

**For Canada refer Canadian Ingersoll-Rand Company, Limited**
**260 St. James Street, Montreal, Quebec**

201-TT

## McGuire-Cummings Manufacturing Co.

**General Offices:**
**111 W. Monroe St., Chicago, Ill.**

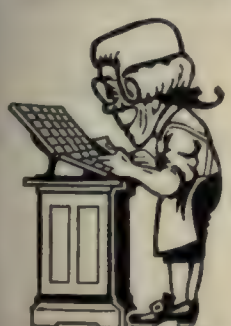


**Street Cars**
**Trucks**
**Snow Sweepers**



**Advertisements for the**

## Searchlight Section



Can be received at the New York Office of Electric Railway Journal until 10 a. m.

## Wednesday

For issue out Saturday

0220



## The "Ideal" Trolley Wheel

***For Electric Railway and Crane Service***

Our new type, low carbon steel flanges are softer than the overhead, thereby conserving it.

Perfect balance allows the Ideal to follow the wire more closely and with less spring tension.

The contact ring and hub is made of pure new copper with a small amount of tin, giving a low electrical resistance.

**EDWARD P. SHARP**
L. E. HARMON, Prop.
308-14 Terrace
Buffalo, N. Y.

*Sales Representatives:*
R. D. NUTTALL CO.
Pittsburgh, Pa.
NATIONAL BRAKE CO., Inc.
Buffalo, N. Y.

General Electric Co.
Irvington Varnish & Ins. Co.
Mica Insulator Co.
Okonite Co.
Westinghouse E. & M. Co.

**Insulation Slot**
Irvington Varnish & Ins. Co.

**Insulators (See also Line Material)**
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hemingray Glass Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co
Westinghouse E & M. Co

**Insulator Pins**
Elec. Service Supplies Co.
Hubbard & Co.

**Jacks (See also Cranes, Hoists and Lifts)**
Buda Company
Elec. Service Supplies Co.

**Joints, Rail (See Rail Joints)**

**Journal Boxes**
Bemis Car Truck Co.
Brill Co., J. G.
St. Louis Car Co.

**Junction Boxes**
Std. Underground Cable Co.

**Lamps, Guards and Fixtures**
Elec. Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Lamps, Arc & Incandescent (See also Headlights)**
General Electric Co.
Westinghouse E. & M. Co.

**Lamps, Signal and Marker**
Nichols-Lintern Co.

**Lanterns, Classification**
Nichols-Lintern Co.

**Lightning Protection**
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Shaw, Henry M.
Westinghouse E. & M. Co.

**Line Material (See also Brackets, Insulators, Wires, etc.)**
Archbold-Brady Co.
Columbia M. W. & M. I. Co.
Dossert & Co.
Electric Ry Equipment Co.
Elec. Service Sup. Co.
Hubbard & Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

**Locomotives, Electric**
Baldwin Locomotive Wks.
General Electric Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
Westinghouse E. & M. Co.

**Locomotives, Oil Engine, Electric Driven**
Ingersoll-Rand Co.

**Lubricating Engineers**
Galena Signal Oil Co.
Standard Oil Co. of Ind.
Texas Company
Universal Lubricating Co.

**Lubricants, Oil and Grease**
Galena-Signal Oil Co.
Standard Oil Co. of Ind.
Texas Company
Universal Lubricating Co.

**Machinery, Insulating**
Amer. Insulating Mach. Co.

**Manganese Steel Guard Rails**
Ramapo Ajax Corp.

**Manganese Steel Switches, Frogs & Crossings**
Bethlehem Steel Co.
Ramapo Ajax Corp.

**Manganese Steel, Special Track Work**
Bethlehem Steel Co.

**Meters (See Instruments)**

**Mica**
Mica Insulator Co.

**Molding, Metal**
Allis-Chalmers Mfg. Co.

**Motor Buses (See Buses, Motor)**

**Motor Leads**
Dossert & Co.

**Motors, Electric**
Westinghouse E. & M. Co.

**Motors and Generator Sets**
General Electric Co.

**Motormen's Seats**
Allis-Chalmers Mfg. Co.
Brill Co., J. G.
Elec. Service Sup. Co.
Hale-Kilburn Co.
Heywood-Wakefield Co.
St. Louis Car Co.
Wood Co., Chas. N.

**Nuts and Bolts**
Bethlehem Steel Co.
Bemis Car Truck Co.
Hubbard & Co.

**Oil Heaters**
Power Specialty Co.

**Oils (See Lubricants)**

**Omnibuses (See Buses, Motor)**

**Oxy-Acetylene (See Cutting Apparatus Oxy-Acetylene)**

**Paints and Varnishes (Insulating)**
Mica Insulator Co
National Ry. Appliance Co.

**Pavement Breakers**
Ingersoll-Rand Co.
Sullivan Machinery Co.

**Paving Brick Vitrified**
Nat'l Paving Brick Mfrs. Ass'n.

**Paving Material**
Amer. Br. Shoe & Fdy. Co.

**Pickups, Trolley Wire**
Elec. Service Supplies Co.
Ohio Brass Co.

**Pinion Pullers**
Elec. Service Supplies Co.
General Electric Co.
Wood Co., Chas. N.

**Pinions (See Gears)**

**Pins, Case Hardened, Wood and Iron**
Bemis Car Truck Co.
Elec. Service Sup. Co.
Ohio Brass Co.
Westinghouse Tr. Brake Co.

**Pins, Wood & Iron**
Sharp, Edw. P.

**Pipe Fittings**
Westinghouse Tr. Brake Co.

**Planers (See Machine Tools)**

**Plates for Tee Rail Switches**
Ramapo Ajax Corp.

**Pliers, Rubber Insulated**
Elec. Service Sup. Co.

**Pneumatic Tools**
Ingersoll-Rand Co.

**Pole Line Hardware**
Bethlehem Steel Co.
Ohio Brass Co.

**Poles, Metal Street**
Bates Expanded Steel Truss Co.
Elec. Ry. Equipment Co.
Hubbard & Co.

**Pole Reinforcing**
Hubbard & Co.

**Poles & Ties Treated**
Bell Lumber Co.
International Creosoting & Construction Co.
National Pole Co.
Truscon Steel Co.

**Poles, Ties, Posts, Piling & Lumber**
Bell Lumber Co.
International Creosoting & Construction Co.
National Pole Co.
Truscon Steel Co.

**Poles, Trolley**
Anderson Mfg. Co., A. & J. M.
Elec. Service Supplies Co.
Nuttall Co., R. D.
Truscon Steel Co.

**Poles, Tubular Steel**
Elec. Ry. Equipment Co.
Elec. Service Sup. Co.

**Portable Grinders**
Buda Company

**Pothreads**
Okonite Co.

**Power Saving Devices**
National Ry. Appliance Co.

**Pressure Regulators**
General Electric Co.
Westinghouse E. & M. Co.

**Pumps**
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.

**Pumps, Air Lift**
Sullivan Machinery Co.

**Pumps, Vacuum**
Ingersoll-Rand Co.
Sullivan Machinery Co.

**Punches, Ticket**
Intern'l Register Co., The
Wood Co., Chas. N.

**Rail Braces & Fastenings**
Ramapo Ajax Corp.

**Rail Filler**
Carey Co., Philip

**Rail Grinders (See Grinders)**

**Rail Joints**
Carnegie Steel Co.
Rail Joint Co.

**Rail Joints—Welded**
Lorain Steel Co.

**Rails Relaying**
L. B. Foster Co.
Hyman-Michaels Co.

**Rails, Steel**
Bethlehem Steel Co.
L. B. Foster Co.
Carnegie Steel Co.

**Railway Paving Guards, Steel**
Godwin Co., Inc., W. S.

**Railway Safety Switches**
Westinghouse E. & M. Co.

**Rail Joints**
Rail Joint Co

**Rail Welding**
Railway Track-work Co.

**Rattan**
Brill Co., The J. G.
Elec. Service Supplies Co.
Hale-Kilburn Co.
Heywood-Wakefield Co.
McGuire-Cummings Mfg. Co
St. Louis Car Co.

**Registers and Fittings**
Brill Co., The J. G.
Elec. Service Supplies Co.
Intern'l Register Co., The
Rooke Automatic Register Co
St. Louis Car Co.

**Reinforcement, Concrete**
Amer. Steel & Wire Co.

**Repair Shop Appliances (See also Coil Banding and Winding Machines)**
Elec. Service Supplies Co.

**Repair Work (See also Coils)**
General Electric Co.
Westinghouse E. & M. Co.

**Replacers, Car**
Elec. Service Sup. Co.

**Resistance, Wire and Tube**
General Electric Co.
Westinghouse E. & M. Co.

**Retrievers, Trolley (See Catchers and Retrievers, Trolley)**

**Rheostats**
General Electric Co.
Mica Insulator Co.
Westinghouse E. & M. Co.

**Rollers, Shade**
Haviland Shade Roller Co.

**Roofs**
Haskelite Mfg. Co.

**Sanders, Track**
Brill Co, The J. G.
Elec. Service Supplies Co.
Nichols-Lintern Co.
Ohio Brass Co.
St. Louis Car Co.

**Sash Fixtures, Car**
Brill Co, The J. G.
St. Louis Car Co.

**Sash, Metal, Car Window**
Hale-Kilburn Co.

**Scrapers, Track (See Cleaners and Scrapers, Track)**

**Screw Drivers, Rubber Insulated**
Elec. Service Sup. Co.

**Seats, Bus**
Hale-Kilburn Co.
Heywood-Wakefield Co.
St. Louis Car Co.

**Seats, Car (See also Rattan)**
Brill Co., The J. G.
Hale-Kilburn Co.
Heywood-Wakefield Co.
St. Louis Car Co.

**Seating Materials**
Brill Co., J. G.
Heywood-Wakefield Co.
St. Louis Car Co.

**Second Hand Equipment**
Electric Equipment Co.
Hyman-Michaels Co.
Transit Equip. Co.

**Shades, Vestibule**
Brill Co., The J. G.

**Shovels**
Allis-Chalmers Mfg. Co.
Brill Co., The J. G.
Hubbard & Co.

**Side Bearings (See Bearings Center and Side)**

**Signals, Car Starting**
Elec. Service Sup. Co.
Nat'l Pneumatic Co., Inc.

**Signals, Indicating**
Nichols-Lintern Co.

**Signal Systems, Block**
Elec. Service Sup. Co.
Nachod Signal Co., Inc.
U. S. Electric Signal Co.
Wood Co., Chas. N.

**Signal Systems, Highway Crossing**
Nachod Signal Co., Inc.
U S Electric Signal Co

**Slack Adjusters (See Brake Adjusters)**

**Sleet Wheels and Cutters**
Anderson Mfg. Co., A. & J. M.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.

**Smokestacks, Car**
Nichols-Lintern Co.

**Snow Sweepers, Rattan**
Heywood-Wakefield Co.

**Snow-Plows, Sweepers and Brooms**
Brill Co., The J. G.
Consolidated Car Fender Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

**Soldering and Brazing Apparatus (See Welding Processes and Apparatus)**

**Special Adhesive Papers**
Irvington Varnish & Ins. Co.

**Special Trackwork**
Bethlehem Steel Co.
Buda Company
Lorain Steel Co.

**Spikes**
Amer. Steel & Wire Co.

**Splicing Compounds**
Westinghouse E. & M. Co.

**Splicing Sleeves (See Clamps and Connectors)**

**Springs, Car and Truck**
Amer. Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Fort Pitt Spring & Mfg. Co.
St. Louis Car Co.

**Sprinklers, Track and Road**
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

**Steel and Steel Products**
Morton Mfg. Co.

**Steps, Car**
Morton Mfg. Co.

**Stokers, Mechanical**
Babcock & Wilcox Co.
Westinghouse E. & M. Co

**Storage Batteries (See Batteries, Storage)**

**Strain, Insulators**
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.

**Strand**
Roebling's Sons Co., J. A.

**Subway Boxes**
Johns-Pratt Co.

**Superheaters**
Babcock & Wilcox Co.
Power Specialty Co.

**Sweepers, Snow (See Snow Plows, Sweepers and Brooms)**

**Switch Stands & Fixtures**
Ramapo Ajax Corp.

**Switches, Safety**
Johns-Pratt Co.

**Switches, Selector**
Nichols-Lintern Co.

**Switches, Tee Rail**
Ramapo Ajax Corp.

**Switches, Track (See Track Special Work)**

**Switches and Switchboards**
Allis-Chalmers Mfg Co.
Elec. Service Supplies Co
General Electric Co.
Westinghouse E. & M. Co.

**Tampers, Tie**
Ingersoll-Rand Co
Railway Track-work Co.

**Tapes and Cloths (See Insulating Cloth, Paper and Tape)**

**Tee Rail Special Track Work**
Bethlehem Steel Co
Ramapo Ajax Corp.

**Telephones and Parts**
Elec. Service Supplies Co.

**Terminals, Cable**
Std. Underground Cable Co.

**Testing Devices, Meter**
Johns-Pratt Co.

**Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)**

**Thermostats**
Gold Car Heating & Lighting Co.
Railway Utility Co.
Smith Heater Co., Peter

**Ticket Choppers & Destroyers**
Elec. Service Supplies Co.

**Ties, All Metal**
Metal Safety R.R. Tie Co.

**Ties and Tie Rods, Steel**
Carnegie Steel Co.
International Steel Tie Co.

**Ties, Wood Cross (See Poles, Ties, Posts, etc.)**

**Tool Steel**
Bethlehem Steel Co.

**Tools, Track & Miscellaneous**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Hubbard & Co
Railway Track-work Co.

**Torches, Acetylene (See Cutting Apparatus)**

**Tower Wagons and Auto Trucks**
McCardell & Co., J. R.

**Towers and Transmission Structures**
Archbold-Brady Co.
Bates Expanded Steel Truss Co.
Westinghouse E. & M. Co.

**Track Grinders**
Railway Track-work Co.
Rail Welding & Bonding Co

**Trackless Trolley Cars**
St. Louis Car Co.

**Track, Special Work**
Bethlehem Steel Co.
Buda Company
N. Y. Switch & Crossing Co.
Ramapo Ajax Corp.
Wharton, Jr., & Co., Inc., W.

**Transfer (See Tickets)**

**Transformers**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Treads, Safety, Stair, Car Step**
Morton Mfg. Co.

**Trolley Bases**
Anderson Mfg. Co., A. J. & J. M.
Elec. Service Supplies Co.
General Electric Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Ohio Brass Co.

**Trolley Bases, Retrieving**
Anderson Mfg. Co., A. & J. M
Elec. Service Supplies Co.
Nuttall Co., R. D.
Ohio Brass Co.

**Trolley Bases**
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.

**Trolley Material (Overhead)**
Bates Expanded Steel Twist
Anderson Mfg. Co., A. & J. M.
Elec. Service Supplies Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.

**Trolley Shoe**
Miller Trolley Shoe Co

**Trolleys & Trolley System**
Ford Chain Block Co

**Trolley Wheels (See Wheels, Trolley)**

**Trolley Wheel Bushings**
More-Jones Brass & Metal Co.

**Trolley Wheels & Harps**
More-Jones Brass & Metal Co.

**Trolley Wire**
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co
Page Steel & Wire Co
Roebling's Sons Co., J. A

**Trucks, Car**
Baldwin Locomotive Wks
Bemis Car Truck Co
Brill Co., The J. G.
McGuire-Cummings Mfg Co
St. Louis Car Co.

**Tubing, Yellow & Black, Flexible Varnish**
Irvington Varnish & Ins Co

**Turbines, Steam**
Allis-Chalmers Mfg Co
General Electric Co
Westinghouse E. & M Co

**Turnstiles**
Elec. Service Supplies Co
Perey Mfg. Co., Inc.

**Valves**
Ohio Brass Co.
Westinghouse Tr. Br. Co

**Varnished Papers**
Irvington Varnish & Ins Co

**Varnished Silks**
Irvington Varnish & Ins. Co

**Varnishes**
Beckwith-Chandler Co.

**Ventilators, Car**
Brill Co., The J. G.
Nat'l Ry. Appliance Co
Nichols-Lintern Co
Railway Utility Co
St. Louis Car Co.

**Vestibule Linings**
Haskelite Mfg. Co.

**Vitrified Paving Brick**
Nat'l Paving Brick Mfrs Ass'n.

**Welded Rail Joints**
Alumino-Thermic Corp.
Electric Railway Impt. Co
Ohio Brass Co.
Railway Track-work Co.

**Welders, Portable Electric**
Electric Railway Impt. Co
Ohio Brass Co.
Railway Track-work Co

**Welding Processes and Apparatus**
Alumino-Thermic Corp.
General Electric Co
Electric Railway Impt. Co
International Oxygen Co
Ohio Brass Co
Railway Track-work Co
Westinghouse E. & M. Co

**Welding Steel**
Electric Railway Impt Co
Railway Track-work Co

**Welding Wire & Rods**
Page Steel & Wire Co.

**Wheel Guards (See Fenders and Wheel Guards)**

**Wheel Presses (See Machine Tools)**

**Wheels, Car Steel & Steel Tire**
Carnegie Steel Co

**Wheels, Trolley**
Elec. Ry. Equipment Co
Gilbert & Sons, B. F. A
Sharp, Edw P

**Wheels, Trolley, Wrought Steel**
Elec. Service Supplies Co
General Electric Co.
Nuttall Co., R. D.

**Whistles, Air**
General Electric Co
Ohio Brass Co.
Westinghouse E. & M. Co

**Wire, Copper Covered, Steel**
Page Steel & Wire Co

**Wire Rope**
Amer Steel & Wire Co
Roebling's Sons Co., J.A.

**Wires and Cables**
Amer Electrical Works
Amer Steel & Wire Co
Anaconda Copper Min. Co
General Electric Co
Kerite Insulated Wire & Cable Co
Okonite Co.
Page Steel & Wire Co.
Roebling's Sons Co J. A
Std. Underground Cable Co
Westinghouse E. & M. Co



Tracks at Oil City, Pa., Carey Elastite Rail Filler Used



Carey Elastite Rail Filler is made to fit any rail section.



# On curves as well as tangents

Carey Elastite Rail Filler is easily shaped on the job to fit any curve. It can be fitted over splice-bars and bolt-heads by simply cutting it out with a hatchet. Every inch of the rail is cushioned.

Street railway and city engineers agree that Carey Elastite Rail Filler saves many times its cost by the reduction of pavement and track maintenance. The absorption of rail-vibration, the prevention of water and frost action, and the dissipation of traffic-impact, saves both the track and the pavement.

The use of Carey Rail Filler secures these advantages and, in addition, materially reduces traffic-noise.

**Elastite Rail Filler**

is easy to install. A tap of a mallet sets it in the web of the rail. Carey Elastite Rail Filler is a composition of specially-tempered asphalt and fibre which is used as a resilient cushion between the rail and the pavement, absorbing traffic-impact, rail-vibration, and traffic-noise.

It is preformed to fit any rail-section and is readily shaped on the job to fit any track-curve. It is unaffected by moisture or temperature changes and is enduring under all service conditions.

THE PHILIP CAREY COMPANY
53 Wayne Ave., Lockland, Cincinnati, O.

Carey Elastite
NAME REG. U.S Patent Office

# RAIL FILLER

# ALPHABETICAL INDEX TO ADVERTISEMENTS


Page

A

Ajax Metal Co. . . . . 48
Allis-Chalmers Mfg. Co. . . . . 45
Allison & Co., J. E. . . . . 20
Alumino-Thermic Corp. . . . . 45
Amer. Brake Shoe & Fdy. Co . 48
American Car Co. . . . . 57
American Electrical Works. . . . 42
American Insulating Mach. Co.. 42
American Steel & Wire Co. . . . . 43
Anaconda Copper Mining Co. . . 42
Anderson Mfg. Co., A. & J. M.. . 32
Archbold-Brady Co. . . . . 21

B

Babcock & Wilcox Co. . . . . 44
Baldwin Locomotive Works. . . . 41
Bates Expanded Steel Truss Co. 16
Beckwith-Chandler Co. . . . . 35
Beeler, John A. . . . . 20
Bell Lumber Co. . . . . 56
Bemis Car Truck Co. . . . . 31
Bethlehem Steel Co. . . . . 44
Bibbins, J. Rowland . . . . . 20
Brill Co., The J. G. . . . . 57
Buchanan & Lyng Corporation. 21
Buda Co. . . . . 44
Bureau of Com. Economics, Inc. 21

C

Cameron Electrical Mfg. Co. . . . 46
Carey Co., Philip. . . . . 55
Carnegie Steel Co. . . . . 46
Cattie & Bros., Jos. P. . . . . 49
Chillingworth Mfg. Co. . . . . 56
Cleveland Fare Box Co. . . . . 47
Collier, Inc., Barron G. . . . . 34
Consolidated Car Fender Co. . . . 40
Consolidated Car Heating Co. . . 37

D

Dayton Mech. Tie Co. . . . . 20 27
Day & Zimmermann, Inc. . . . . 20
Differential Steel Car Co., The.. 49
Dossert Co. . . . . 43
Drum & Co., A. L. . . . . 21

E

Earll, C. I. . . . . 50
Electric Equipment Co. . . . . 51
Electric Railway Equipment Co. 8
Electric Railway Improvement Co. . . . . 46
Electric Service Supplies Co. . . 7

F

Flower, D. B. . . . . 48
Ford, Bacon & Davis . . . . . 20
Ford Chain Block Co. . . . . 47
"For Sale" Ads. . . . . 51
Fort Pitt Spring & Mfg. Co. . . . 50
Foster Co., L. B. . . . . 46

G

Galena-Signal Oil Co. . . . . 17
Garford Motor Truck Co. . . . . 22
General Electric Co. . 18, Back Cover
Gold Car Heating & Ltg. Co. . . 49

H

Hale-Kilburn Co. . . . . 49
Haskelite Mfg. Co. . . . . 49
Haviland Shade Roller Co . . . 45
"Help Wanted" Ads. . . . . 51
Hemingray Glass Co. . . . . 42
Hemphill & Wells. . . . . 20
Heywood-Wakefield Co. . . . . 39
Holst, Englehardt W . . . . . 20
Horne & Ebling. . . . . 50
Hubbard & Co. . . . . 42
Hyman-Michaels Co. . . . . 51

I

Industrial Works . . . . . 40
Ingersoll-Rand Co. . . . . 53
International Creosoting & Construction Co. . . . . 28
International Motor Co. . . . . 12-13
International Register Co., The. 47
International Steel Tie Co., Front Cover
Irvington Varnish & Insulator Co. 45

J

Jackson, Walter . . . . . 20
Jeandron, W. J. . . . . 48
Johnson & Co., J. R. . . . . 50
Johnson Fare Box Co. . . . . 47
Johns-Pratt Co. . . . . 44

K

Kelly-Cooke Co. . . . . 20
Kerite Insulated Wire & Cable Co. . . . . 43
Kuhlman Car Co. . . . . 57

L

Laclede Steel Co. . . . . 38
Le Carbone Co. . . . . 48
Long Co., E. G. . . . . 45
Lorain Steel Co. . . . . 44

M

McCardell Co., J. R . . . . . 45
McGuire-Cummings Mfg. Co. . . . 53
Mica Insulator Co. . . . . 46
Miller Trolley Shoe Co . . . . 25
Mon-Jones Brass & Metal Co. . 30
Morton Mfg Co . . . . . 50

N

Nachod Signal Co. Inc. . . . . 45
National Brake Co . . . . . 19
National Paving Brick Mfrs. Assn. . . . . 29
National Pneumatic Co., Inc. . . 9
National Pole Co. . . . . 24
National Railway Appliance Co. 46
Nichols-Lintern Co. . . . . 47
N. Y. Switch & Crossing Co. . . 44
N. Y. Transportation Co. . . . . 11
Nuttall Co., R. D . . . . . 39

O

Ohio Brass Co. . . . . 5
Okonite Co., The . . . . . 46
Ong., Joe B. . . . . 21

P

Page Steel & Wire Co. . . . . 43
Panelyte Co. . . . . 49
Perey Mfg. Co., Inc. . . . . 47
Petry Co., Inc., N. A. . . . . 21
Positions Wanted and Vacant. . 51
Power Specialty Co. . . . . 45

R

Rail Joint Co. . . . . 
Railway Audit & Inspection Co. 
Railway Track-work Co. . . . . 
Railway Utility Co. . . . . 
Ramapo Ajax Co. . . . . 
Richey, Albert S . . . . . 
Robinson Co., Dwight P . . . . . 
Roebling's Sons Co., John A . . . 
Rooke Automatic Register Co . . . 
Root Spring Scraper Co . . . . . 

S

St. Louis Car Co. . . . . 
Safety Car Devices Co. . . . . 
Samson Cordage Works. . . . . 
Sanderson & Porter. . . . . 
Searchlight Section . . . . . 
Sharp, Edw. P. . . . . 
Shaw, Henry M. . . . . 
Silver Lake Co. . . . . 
Smith Heater Co., Peter . . . . . 
Standard Oil Co. . . . . 
Standard Underground Cable Co. 
Star Brass Works. . . . . 
Stevens & Wood, Inc . . . . . 
Stone & Webster . . . . . 
Stucki Co., A. . . . . 
Sullivan Machinery Co . . . . . 

T

Texas Co. . . . . 
Tool Steel Gear & Pinion Co., The . . . . . 
Transit Equip. Co. . . . . 
Truscon Steel Co. . . . . 

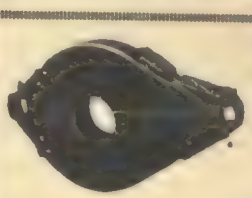
U

Universal Lubricating Co. . . . . 
U. S. Electric Signal Co. . . . . 

W

"Want" Ads . . . . . 
Wason Mfg. Co . . . . . 
Westinghouse Electric & Mfg. Co . . . . . 
Westinghouse Traction Brake Co 
White Engineering Corp., J. G. . 
Wish Service, The P. Edw . . . . 
Wood Co., Chas. N. . . . . 

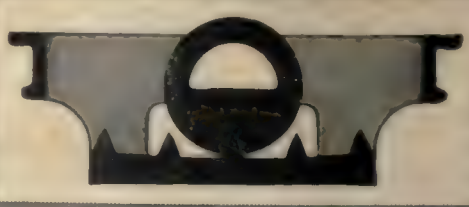




CHILLINGWORTH
One-Piece Gear Cases
Seamless—Rivetless—Light Weight
Best for Service—Durability and Economy. *Write Us.*
Chillingworth Mfg. Co.
Jersey City, N. J.

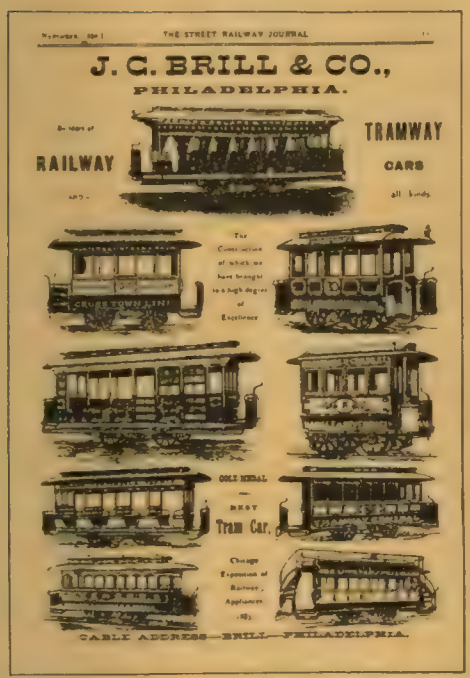
"Axle Specialists Since 1866"
Address all Mail to Post Office Box 515, Richmond, Va.
CAR AXLES
J. R. JOHNSON AND CO., INC.
FORGED STEEL AXLES
For Locomotives, Passenger, Freight and Electric Cars
Smooth Forged or Rough Turned—Carbon or Alloy Steel—Plain or Heat Treated, Forged and Turned Piston Rods, Crank Pins, Large Shafts, Round Bars, etc.

Northern CEDAR POLES Western
We guarantee
all grades of poles; also any butt-treating specifications
BELL LUMBER COMPANY
Minneapolis, Minn.



STUCKI SIDE BEARINGS
A. STUCKI CO.
Oliver Bldg.
Pittsburgh, Pa.

# Forty Years of Progress




An Advertisement Which Appeared in the First Issue of the "Street Railway Journal" in November, 1884. The Brill Company is the Only Advertiser of that First Issue that Remains in the Field Today and It Has Been Represented in Practically Every Issue Since that Time

In marking its fortieth anniversary in its issue of December 6 the Electric Railway Journal reproduced on page 948 the first Brill advertisement in the very first issue of the old Street Railway Journal November, 1884.

While the advertisement appeared sixteen years after the company started to manufacture horse cars, the type of cars illustrated, when compared with modern types, shows the great advance which has been made in rolling stock design and construction during these forty years. Such a long association with the industry, which this company has had the privilege to enjoy, has resulted in an unshaken belief in its continued development and ability to meet the very exacting requirements of mass transportation.

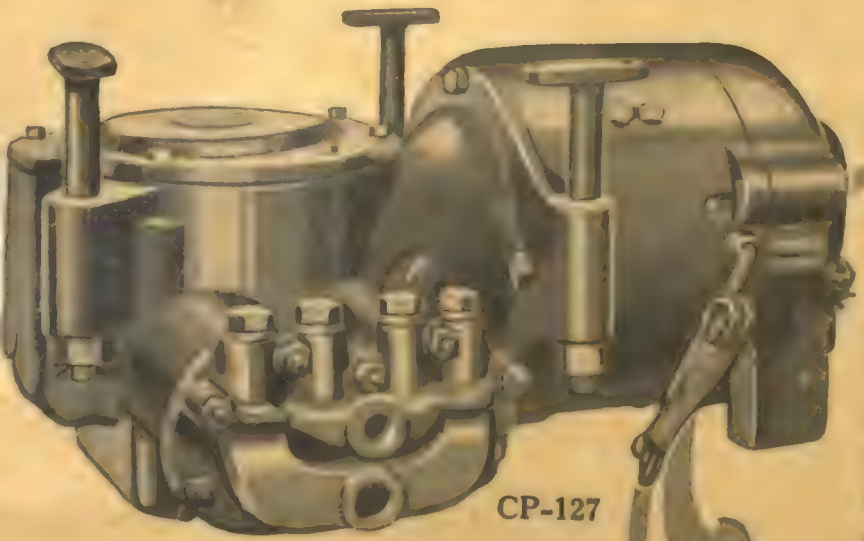


*One hundred and fifty cars of this type are now on order for Brooklyn*

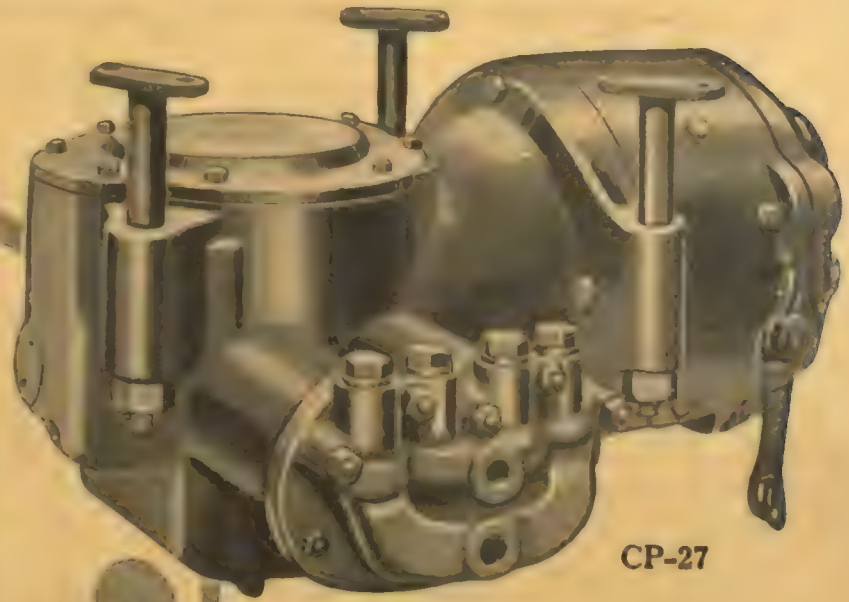
THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

AMERICAN CAR CO. ST. LOUIS MO. — G.C. KUHLMAN CAR CO. CLEVELAND, OHIO. — WASON MANF'G CO. SPRINGFIELD, MASS.

# Type CP—*the Low-Maintenance Compressor*

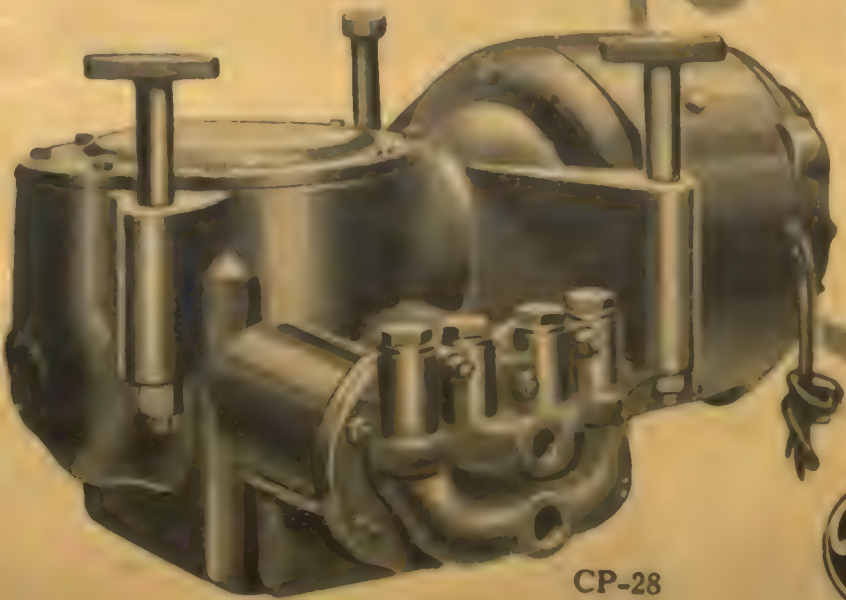


CP-127

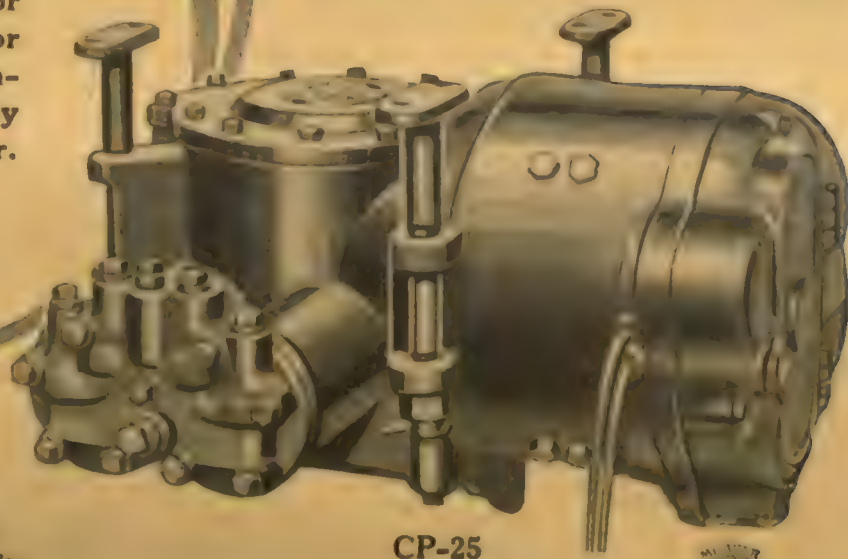


CP-27

THE popularity of the CP Compressor is evidenced by repeat orders—the best recommendation for any machine—received since January 1 for more than 700 new units. The CP line includes designs for any class of service, city or interurban, and the maintenance cost averages only $3 per Compressor per year.



CP-28



CP-25

General Electric Company
Schenectady, N. Y.
Sales Offices in all Large Cities

85-171

# GENERAL ELECTRIC

cGraw-Hill Company, Inc. December 27, 1924 Twenty Cents Per Copy

# ELECTRIC RAILWAY JOURNAL

**Two hundred fifty "Mitten Management" gasoline-electric Yellow Coaches have been ordered by the Philadelphia Rapid Transit Co. to supplement their street car service * * * This is the largest single motor coach order in the history of this new mode of transportation * * * During the past year six hundred Yellow Coaches have been ordered to supplement and extend traction service**



**YELLOW COACH MANUFACTURING CO.**
**Austin & Dickens Aves., Chicago, Ill.**



# Better Public Relations, Better Service and Better Income—Our 1925 Resolution

"Boys!", said Big Bill, the Master Mechanic, "Doughboy Dan, our Transportation Engineer and myself have just left the General Manager's office. He paid all of us a fine compliment for the splendid progress we have made during the year on better Maintenance and Service, and has approved our plans for the coming year, but in addition to that, he wants us to get aboard of the Company's program for Better Public Relations and Increased Revenue. He said that the homes of every one of our men should be a *broadcasting station*, sending out constructive, helpful information about the Company and what we are accomplishing among their neighbors and people with whom they come in contact, and that our Staff Leaders should develop the ability to give talks in their neighborhood before various Civic Associations and Clubs. Doughboy Dan has been assigned the duty of developing this activity in our department. Dan, tell them what your plans are."

Dan stated: "The first thing I suggest is that we read and digest the Westinghouse Co-operative public advertisements that have been put out the last few years, such as '*Jammed*,' '*Street Cars Build Homes*,' '*You Need Street Cars*,' '*The Wheels of Progress Are Under Your Street Cars*,' and the like. These ads are highly educational and informative. Another thing to grapple with is Freight Haulage on our Interurban lines. Westinghouse specialists have been doing a remarkable amount of study and co-operative service on this. Each of us should get a copy of Westinghouse Special Publication No. 1634 on Freight Haulage. I am also going to get our Educational Directors busy on a special course of training on public speaking and the economics of our transportation business."

## WESTINGHOUSE 1925 PROGRAM

For Better Maintenance—Better Service—
Better Public Relations,
and Increased Earnings for the Industry

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.
*Sales Offices in All Principal American Cities*

MEMBER AERA

W WESTINGHOUSE ELECTRIC

# Westinghouse

Vol. 64, No. 26 New York, December 27, 1924 Pages 1063-1098

# ELECTRIC RAILWAY JOURNAL

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

MORRIS BUCK
Associate Editor
C. W. SQUIER
Associate Editor
JOHN A. MILLER, Jr.
Assistant Editor
C. J. MacMURRAY
News Editor

CHARLES GORDON
Western Editor
Old Colony Bldg., Chicago
MERRILL B. KNOX
Editorial Assistant
Old Colony Bldg., Chicago
CARL W. STOCKS
Associate Editor

## CONTENTS

DECEMBER 27, 1924

**Editorials** ..... 1063

**Boston "L" Woodworking Shop Uses Individual Drive—III** ..... 1065
A great variety of equipment is installed for car repair work in new Everett shops. Machine shop is temporarily housed in the wood shop. Method of stripping and rebuilding a car described.

**Boston-Lowell Buses Run Express** ..... 1071

**Giving the Riders Somewhere to Go** ..... 1072

**Many Railway Improvements in Central Pennsylvania** 1073
BY SPECTATOR.
New cars, extensive track reconstruction, better shop facilities and bus operation are among the recent developments at Johnstown, Altoona, Harrisburg and York.

**Work of the Baltimore Mileage Bureau** ..... 1077
New system installed obtains mileage by lines, days, individual cars, etc. Automatic tabulating machines make calculation for any desired classification quick and accurate.

**Inspection Schedule Reduces Accidents** ..... 1079
Specified dates each month used for consideration of certain operating points has reduced the number of accidents in El Paso remarkably in a two-year period.

**The Readers' Forum** ..... 1080

**Association News and Discussion** ..... 1082

**Features of Second Convention of Central European Street Railways** ..... 1082
At the September meeting of the International Street and Interurban Railway Association many features of equipment and track design, maintenance methods, fares and employment problems are discussed.

**American Association News** ..... 1083

**Maintenance of Equipment** ..... 1084

**News of the Industry** ..... 1087

**Financial and Corporate** ..... 1093

**Personal Mention** ..... 1096

**Manufactures and the Markets** ..... 1097

**McGraw-Hill Company, Inc., Tenth Ave. at 36th St., New York**

JAMES H. McGRAW, President
ARTHUR J. BALDWIN, Vice-President
MALCOLM MUIR, Vice-President
J. H. McGRAW, Vice-President
MASON BRITTON, Vice-President
JAMES H. McGRAW, JR., Vice-Pres. and Treas.
J. H. THOMPSON, Secretary

WASHINGTON: Colorado Building
CHICAGO: Old Colony Building
PHILADELPHIA: Real Estate Trust Building
CLEVELAND: Leader-News Building
ST. LOUIS: Star Building
SAN FRANCISCO: 883 Mission Street
LONDON: 6 Bouverie Street, London, E. C. 4

Member Associated Business Papers, Inc.
Member Audit Bureau of Circulations

1924

Cable Address: "Machinist, N. Y."
Publishers of
*Engineering News-Record*
*American Machinist*
*Power*
*Chemical and Metallurgical Engineering*
*Coal Age*
*Engineering and Mining Journal-Press*
*Ingeniería Internacional*
*Bus Transportation*
*Electric Railway Journal*
*Electrical World*
*Electrical Merchandising*
*Journal of Electricity*
(*Published in San Francisco*)
*Industrial Engineer*
(*Published in Chicago*)
*Electrical Retailing*
(*Published in Chicago*)
*American Machinist—European Edition*
(*Published in London*)

The annual subscription rate is $4 in the United States, Canada, Mexico, Alaska, Hawaii, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, Columbia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brazil, Spain, Uruguay, Costa Rica, Ecuador, Guatemala and Paraguay. Extra foreign postage to other countries $3 (total $7 or 29 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid to any part of the world, 20 cents.

Change of Address—When change of address is ordered the new and the old address must be given, notice to be received at least ten days before the change takes place.

Copyright, 1924, by McGraw-Hill Company, Inc.

Published weekly. Entered as second-class matter, June 23, 1908, at the Post Office, at New York, under the Act of March 3, 1879. Printed in U.S.A.

## *64th Volume Indexed*

WITH the completion of Volume 64 of ELECTRIC RAILWAY JOURNAL this week, covering the last six months of 1924, the index for this volume is bound in as an integral part of this issue. This has been a feature of JOURNAL service for many years. It is well understood by the older subscribers of the paper, who keep the indexes available so as to facilitate reference to the volumes.

For those who bind the JOURNAL in permanent form the index section also provides the title page. It should be placed in the front of the volume. But in any event the index should be kept handy, for its references will be found of value to every subscriber whenever information is needed regarding events or practices chronicled during the past six months.

Reference is made easy by classification of articles by subjects as well as by cities and companies. The principal subjects are classified in a list of key words printed ahead of the alphabetical index. Then, too, articles are cross-indexed so that there are several ways by means of which they may be located quickly.

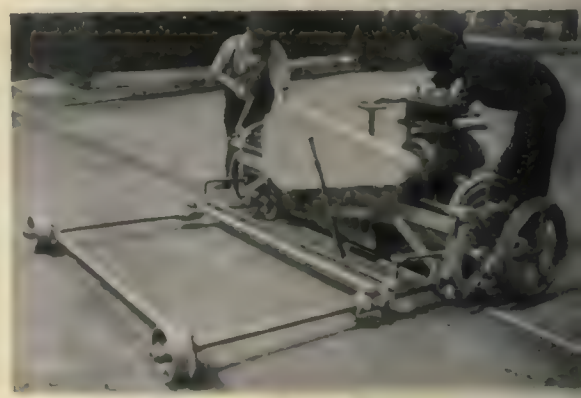
Number of Copies Printed, 6,250

# Happy New Year!

May you have smooth track to happiness, may you weld the good-will of your public permanently to your organization, may your daily grind prove profitable—may you thrive in 'twenty-five.



"Reciprocating" Track Grinder



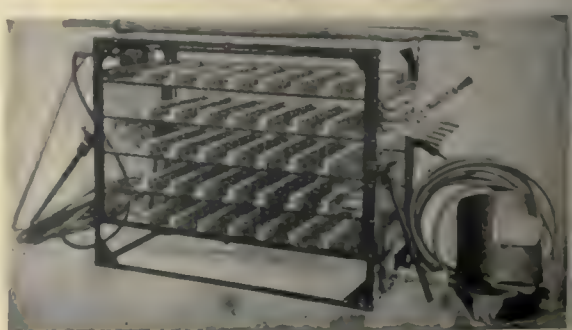
"Vulcan" Rail Joint Grinder



"Atlas" Rail Grinder



"Hercules" Swing Frame Rail Grinder



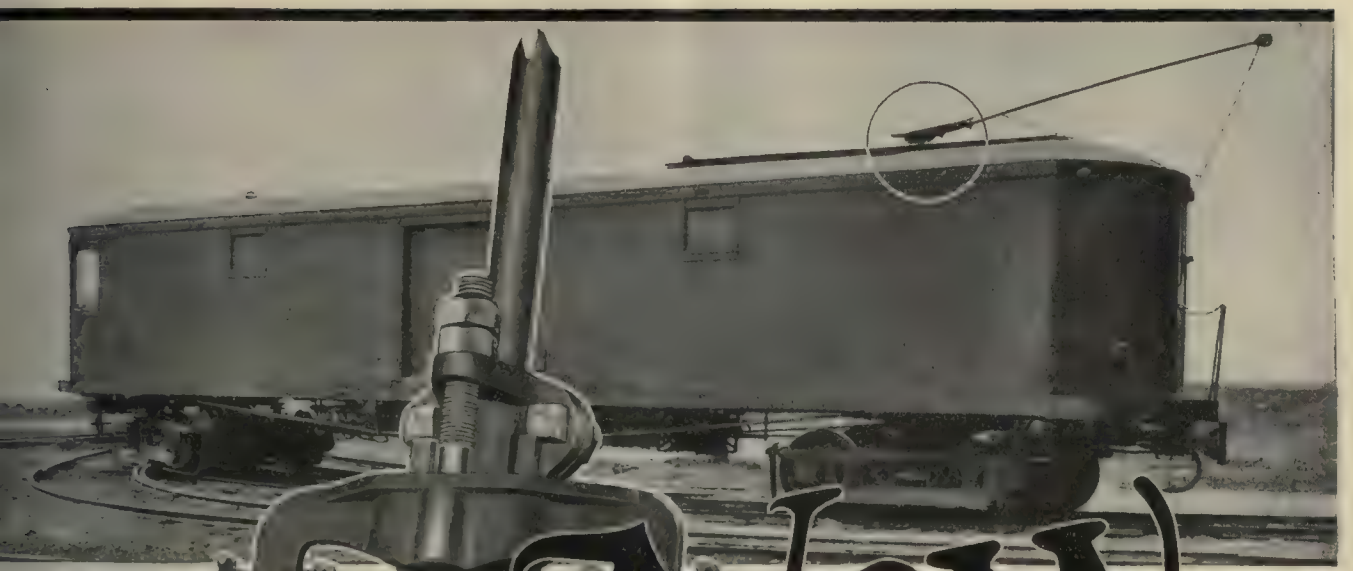
"Ajax" Electric Arc Welder

**Railway Track-work Co.**

3132-48 East Thompson Street, Philadelphia

AGENTS:
Chester F. Gailor, 30 Church St., New York
Chas. N. Wood Co., Boston
Electrical Engineering & Mfg. Co., Pittsburgh
Atlas Railway Supply Co., Chicago
Equipment & Engineering Co., London

366

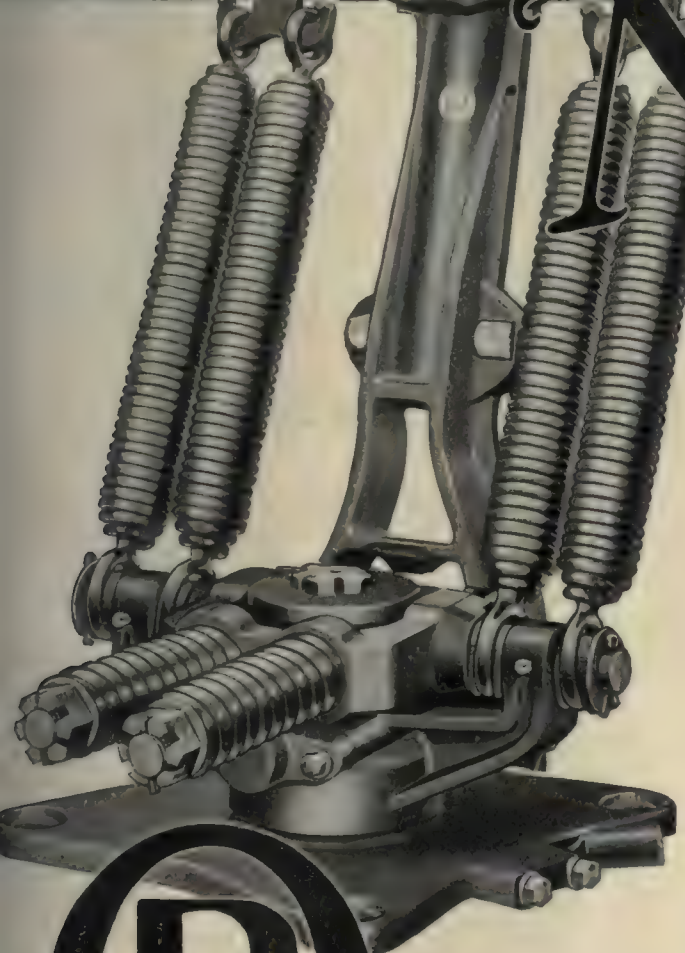


New

An O-B Base with Timken Roller Bearings

An O-B Trolley Base with standard Timken Roller Bearings is now ready. Bearing housing carries contact brush that shunts current around the bearings. Let us send you complete details.

**The Ohio Brass Company**
**Mansfield, Ohio, U. S. A.**





O B CAR EQUIPMENT

# WESTINGHOUSE AUTOMOTIVE AIR BRAKES




## Control Buses on the following Traction Properties

Beaver Valley Traction Co.
Chicago, North Shore & Milwaukee R.R.
Connecticut Co.
City of Detroit St. Ry.
East St. Louis and Suburban Ry. Co.
Eastern Massachusetts St. Ry. Co.
Hartford & Springfield St. Ry. Co.
Houston Electric Co.
Los Angeles Ry. Co.
Milwaukee Electric Ry. & Light Co.
Los Angeles Bus Co. (jointly owned by Los Angeles Ry. and Pacific Elec. Ry.)
Monongahela West Penn Public Service Co., Fairmount, W. Va.
Portland Electric Power Co.
Public Service Corp. of New Jersey.
Puget Sound Inter. Ry. & Power Co.
United Electric Railways, Providence, R. I.
San Diego Electric Railway.

You also should install Westinghouse Automotive Air Brakes on the buses you operate, and thus safeguard the riding public, who have learned to depend upon the safety and time-saving assured by the Air Brake.

Westinghouse Traction Brake Company
AUTOMOTIVE DIVISION
General Office and Works: Wilmerding, Pa.

*Automotive Air Brakes Sell Transportation*



# THE FIFTEENTH YEAR

**37%** More Twin Ties sold than in 1923.

**80%** Sold to Companies with upwards of 13 years experience with Steel Tie Construction.

**20%** Sold to new customers.

There is a definite relation between this record year for sales of Steel Twin Ties and Track Costs for initial installation and maintenance on over 147 properties in the United States and Canada.

While the complete presentation of this data in our book, "Steel Tie Track Construction" is persuasive, it is not dangerous.

Expose yourself to it by directing us to mail it to your office or home.

**THE INTERNATIONAL STEEL TIE COMPANY**
**Cleveland, Ohio**

# Steel Twin Tie Track

**Renewable Track · · Permanent Foundation**

# We Work With Waxes



*One of the "streets" in the Mitchell-Rand plant, Jersey City, N. J. Transporting Synthetic Ceresin Wax to the loading platform.*

Vast quantities of artificial ceresin are used in the manufacture of pharmaceutical creams, perfumery, paper, polishes, rubber mixtures, paints, wax figures, etc.—an almost endless list.

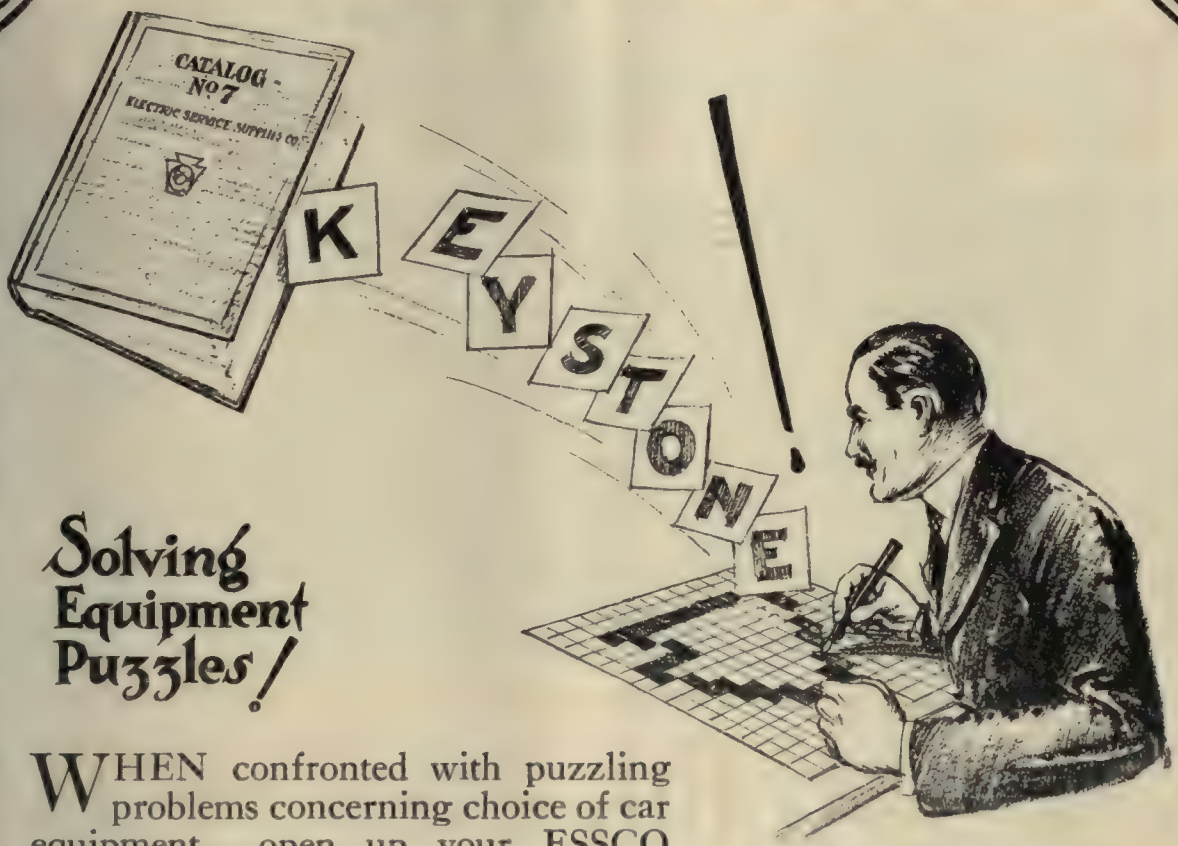
# MITCHELL-RAND MAKES MANY MIXTURES

Animal, Vegetable and Mineral Waxes—gathered from China, Japan, India, Galicia, Saxony, Mexico, Brazil and the Americas—are employed in the manufacture of our insulating and commercial compounds.



**Everything in Insulation**

## MITCHELL-RAND MFG. CO., 15 VESEY STREET NEW YORK, N. Y.




# Solving Equipment Puzzles!

WHEN confronted with puzzling problems concerning choice of car equipment — open up your ESSCO CATALOG No. 7. The answer will be found quickly.

In the *Keystone* Line of Car Equipment, you will find the most up-to-date, efficient, and satisfactory materials and devices. Specify them for your new cars. Order them to carry out your modernization program with the older cars.

*Some items from*

**ESSCO CATALOG NO. 7**

***the Car Equipment Book***

Golden Glow Headlights
Faraday Signal Systems
Hunter-Keystone Signs
Steel Gear Cases
Motormen's Seats
Lighting Fixtures
Headlight Resistances
Air Sanders
Trolley Catchers
Shelby Trolley Poles
Rotary Gongs
International Fare Registers
Fare Register Fittings
Samson Cordage
Air Valves
Cord Connectors
Trailer Connectors
Automatic Door Signals
Standard Trolley Harps
Standard Trolley Wheels
Segur Coil Winding Tools
Peerless Armature Machines
Insulating Materials
Cass Commutator Stones
Sand Driers
Peerless Pinion Pullers
Employees' Badges
Line Material
Portable Lamp Guards

# ELECTRIC SERVICE SUPPLIES CO.

PHILADELPHIA
17th and Cambria Sts.

PITTSBURGH
829 Oliver Building

NEW YORK
50 Church St.

SCRANTON
316 N. Washington Ave.

CHICAGO
Monadnock Bldg.

BOSTON
88 Broad St.

Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Vancouver



UNA
RAIL BONDS



# Now! Applied by "Gas"

**The Long-life, Highly Conductive Copper to Steel Welded UNA Bond is now applied by either the Electric Arc or Gas Flame methods.**

### The UNA Weld.

No matter which method is used the resulting copper to steel weld is identical. The same bonds and molds are used, the only difference in either method being the source of heat. In one case it's the heat of the carbon arc, in the second case it's the heat of the arc drawn by the metal electrode and in the third case it's the heat of the gas flame (oxy-acetylene).

### The UNA Mold.

The UNA Mold positions and holds the bond head against the rail. *It retains the molten metal until the weld forms. The mold not only simplifies the bonding for the welder but also speeds up the process.*

### UNA—The Universal Bond.

With one stock of standard UNA Bonds and Molds either of the three methods of Bonding may be used. If electric power is available either of the electric arc methods may be the most suitable. For pickup bonding or if power is not available, the gas flame method will meet your bonding needs.

As the same bonds and molds are used, UNA Bonding offers a *Universal Bonding Method* that economically meets every bonding condition.

***Send for details***

## RAIL WELDING & BONDING COMPANY, Cleveland, Ohio

**Agents in England: Scholey Construction Company, 137 Victoria Street, Westminster, London**



# The Exit Doors Are Automatic

## On Chicago's Latest Type Multiple Unit Cars!

*Of course*
**NATIONAL PNEUMATIC DOOR ENGINES**
*are used*

## Here's the story!

OVER two years ago, Chicago installed in addition to "Safety Car Devices Equipment," *automatic* doors on 45 double truck one man cars. Today they are putting them on 100 new cars, designed for single and multiple unit operation in congested districts. This is a tribute not alone to the success of the Automatic Door, but also to another successful adaptation of National Pneumatic Equipment.

And furthermore, National Pneumatic Door Equipment is standard in Chicago, as it is in nearly all the leading American cities.

**National Pneumatic Co., Inc.**

*Originators and Manufacturers*

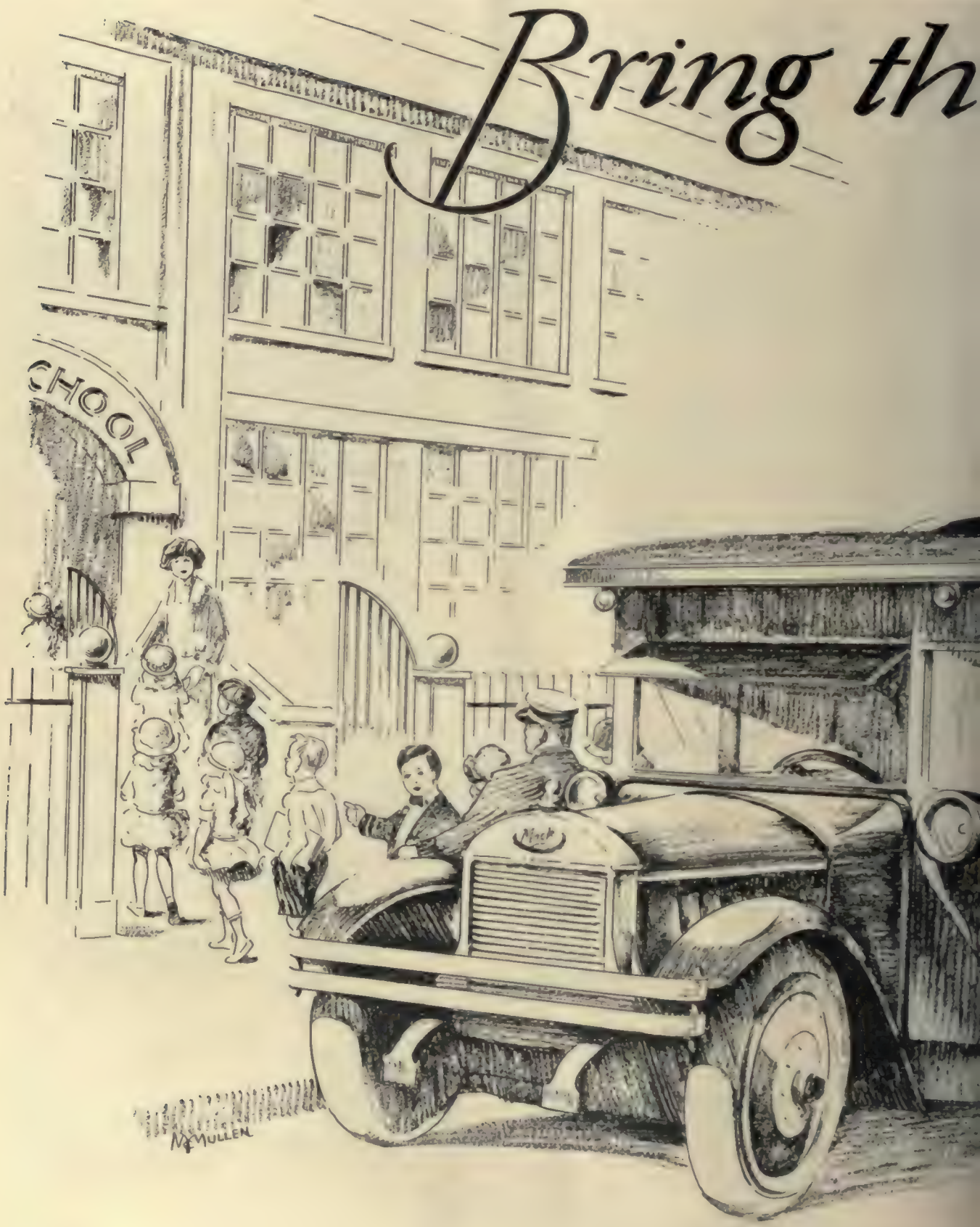
***Executive Office:* 50 Church Street, New York**

Philadelphia—1010 Colonial Trust Building
Chicago—940 McCormick Building
General Works—Rahway, New Jersey

*Manufactured in Canada by*
*Dominion Wheel & Foundry Co., Ltd., Toronto, Ont.*






Bring th
CHOOL
McMULLEN

# Children to school in Mack Buses!

Ask any of the mothers in your community how much thought they have given to the problem of getting the children off to school. They'll tell a story of worry and anxiety.

For in most cases small children can not be allowed to travel alone in crowded cars. Either mother must go along, or the kiddies must walk,— and nine times out of ten the kiddies walk.

How welcome would be a school bus service,— with trusty, safe, dependable Mack Buses? And a driver who would take good care of the little ones from door to door.

Mothers relieved of all anxiety would bless the railway company,— goodwill well worth having. Thousands of children riding, where previously they had walked would mean a substantial increase in fare-box receipts.

All through a comparatively small investment in equipment, which because of its flexibility, could always be used to utmost advantage.

Progressive electric railways are turning more and more to Mack Buses for auxiliary service of this kind. They find in Mack Bus design and exclusive mechanical features, that solid dependability so vital whether the service be taking the kiddies to school, feeding an outlying district, or helping ease congested car lines in busy sections.

From bumper to tail light, the Mack is all bus; — built for utmost efficiency and economy in bus operation.

For example there is the sturdy long-life Mack engine.

The specially designed low bus chassis.

Wide tread assuring safety and permitting a short turning radius.

The Mack dual reduction drive axle, especially designed to give maximum road and underbody clearance.

The Mack transmission with ground gears.

Dual system of brakes on rear wheels and drive shafts.

The Mack Shock Insulator. (All spring ends are embedded in rubber shock insulator cushions, assuring ease of riding and less wear.)

The kiddies are doubly safe in a Mack Bus.

MACK TRUCKS, INC.
INTERNATIONAL MOTOR COMPANY
25 BROADWAY NEW YORK CITY

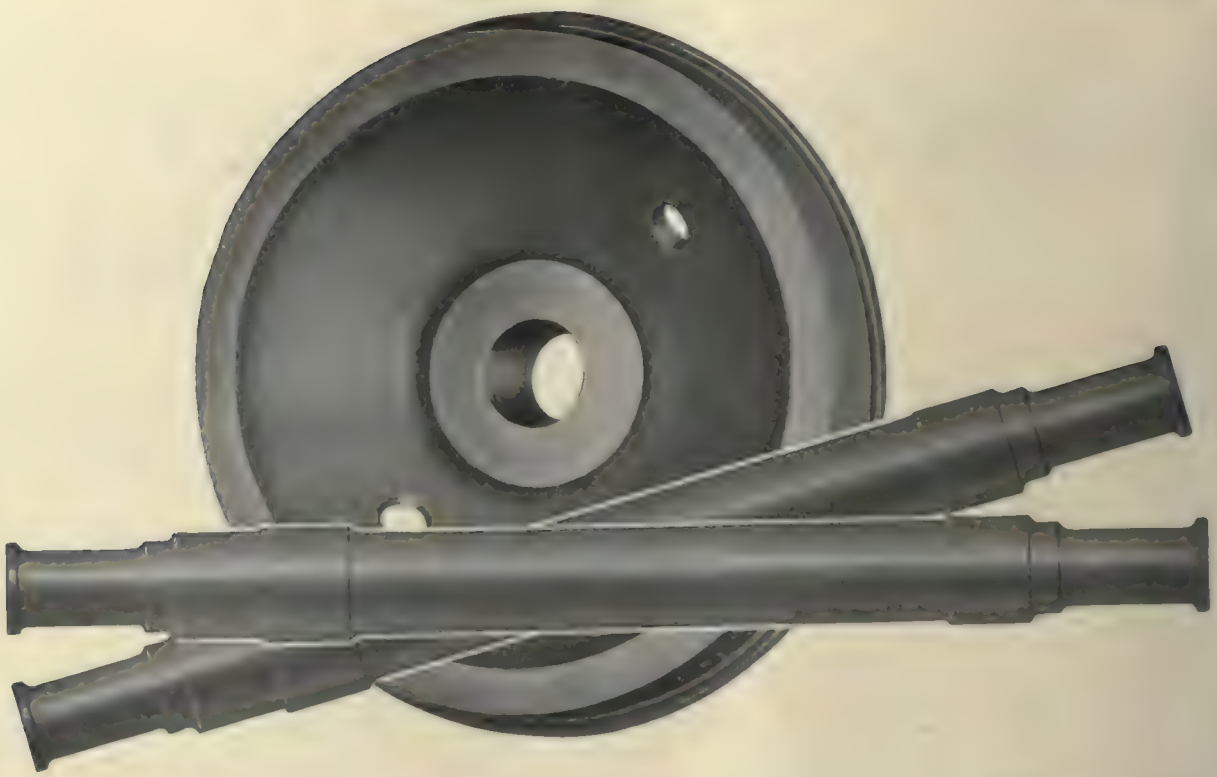
Eighty-three direct MACK factory branches operate under the titles of: "MACK MOTOR TRUCK COMPANY" and "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION."

# The Mack Bus



Sedan Type Bus

*Performance counts!*



# *Cambria Rolled Steel Car Wheels and Forged Axles*

CAMBRIA ROLLED STEEL CAR WHEELS for Electric Service are made at the Johnstown Plant of Bethlehem Steel Company by a combination rolling and forging process. This process thoroughly works the steel and gives an exceptional refinement in structure which does not readily develop flat spots. For this reason Cambria Rolled Steel Car Wheels will give you the longest service at lowest cost.

CAMBRIA FORGED AXLES for Street, Interurban, Subway and Elevated cars, and Armature Shafts for Electric Service are made in the Axle Plant to meet any reasonable specification. They can be furnished treated or untreated; solid or hollow bored; smooth forged only; rough turned all over; rough turned on journals and wheel seats; or finished turned on journals and wheel seats.

We will also mount wheels on the axles if so desired

Specify Cambria Rolled Steel Car Wheels and Forged Axles on your next order.

Large stocks of wheels and axles in standard sizes assure prompt shipment.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Sales Offices

New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Buffalo, Pittsburgh, Cleveland, Detroit, Chicago, Cincinnati, St. Louis, San Francisco

Bethlehem Steel Export Corporation, 25 Broadway, New York City
Sole Exporter of Our Commercial Products

# BETHLEHEM




## Listen in on Station CCH

**This is station CCH, the Consolidated Car Heating Company, broadcasting its usual weekly program to the electric railway industry, direct from its factory, at Albany. This station is operating on a wave length of satisfaction.**

# Underwriters approval—
## ON CONSOLIDATED ELECTRIC CAR HEATERS

IT MEANS SOMETHING to you to know that **26 different types of Consolidated Electric Car Heaters have been inspected and approved by the Underwriters Laboratories Maintained by the National Board of Fire Underwriters.**

Critical inspection of Consolidated Electric Car Heaters reveals many safety features which inspire confidence. No red-hot wires. Asbestos safety cord through coils binds coils securely to porcelain insulator. Every coil used is accurately measured for electrical resistance. Cases are tamper and fool-proof.

Station CCH now signing off until this time next week when the broadcasting program will be resumed.

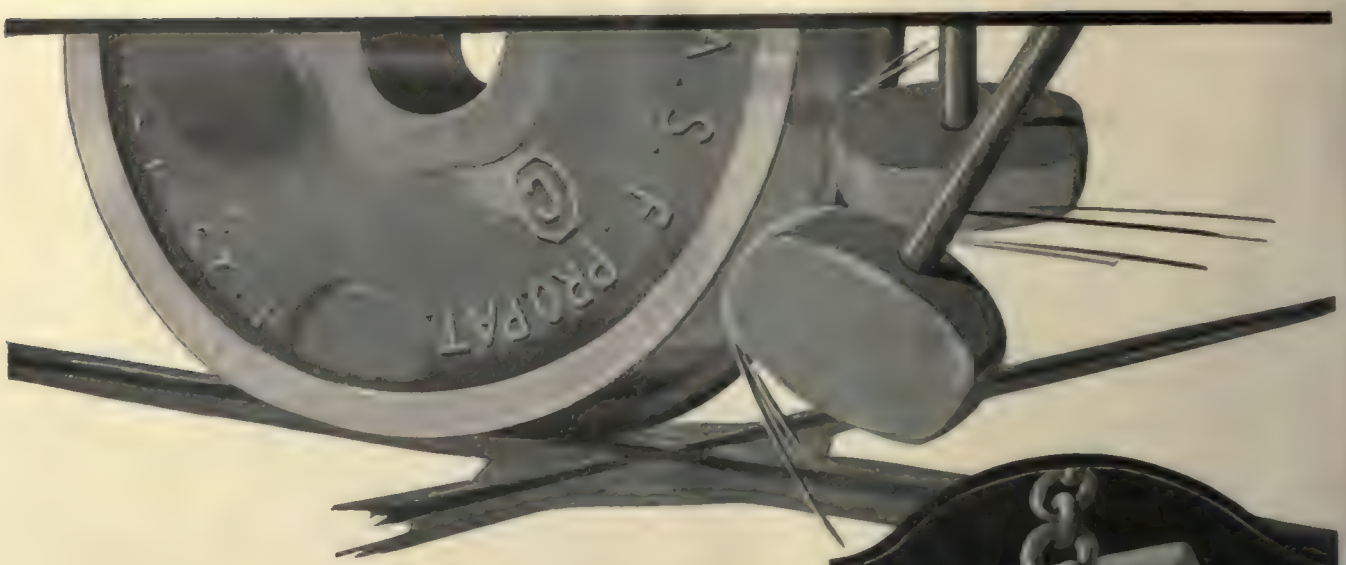
Good day!

**CONSOLIDATED HEATERS**




**CONSOLIDATED CAR HEATING COMPANY**
ALBANY, N. Y.

New York Chicago





# Skull Crackers

## Smash! Crash! Bang!

THE hammer blows of the maker's tests are repeated a thousand times a day as car wheels pound over track crossings, over frogs, switches and low joints.

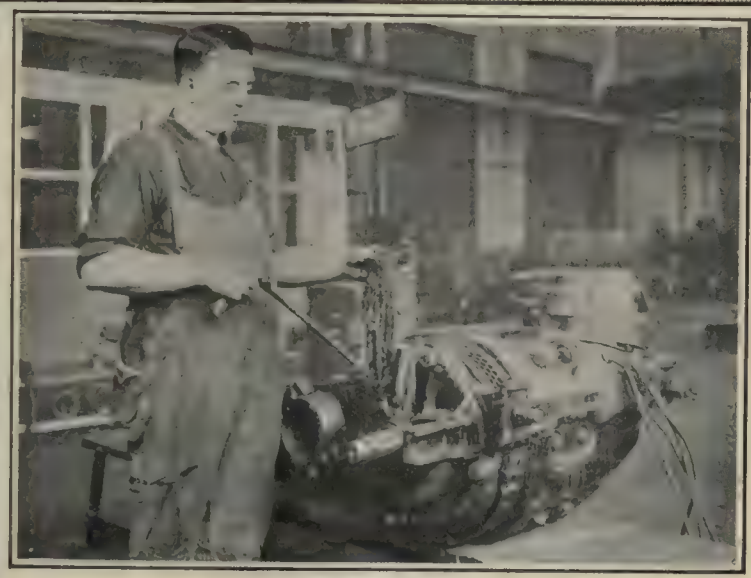
"Skull cracker" is the suggestive name by which this testing equipment is known. Tests on Davis "One-Wear" Steel Wheels made with this instrument of torture show that they are able to withstand the impact and shocks of service, without chipping or cracking, better than any wheel made.

Records of Davis "One-Wear" Steel Wheels in operation on scores of roads back this up in actual service.

**American Steel Foundries**
NEW YORK CHICAGO ST. LOUIS

# DAVIS
"ONE-WEAR"
# STEEL WHEELS

# Galena Oils and Service



## Doing it right!

### How?—When?—Where?—and What?

Four fundamental questions in electric railway lubrication problems!

On the correct answers to these questions and the efficient execution of the policies laid out, depend nearly the whole structure of truck and motor bearing maintenance costs.

Galena Lubrication is more than oil alone. It is oil plus experience plus service. Each of these factors is essential to good results. With the best of oils as a base, Galena applies a lifetime of experience to produce the right lubricant to fit each condition and then through Galena Service insures its proper employment.

Galena Lubrication always results in increased availability of equipment, fewer delays and lowered maintenance cost.

## Galena-Signal Oil Company

New York • Franklin, Pa. • Chicago

• and offices in principal cities •



Type AW Resistor Arc Welder

**Type AW Arc Welder**

—weighs 140 lbs.

—does good work in quick time at minimum cost

—withstands wear of weather

—specially designed for welding rail bonds, fish plates, etc.

—operates on 400/650 volts, and welding current can be varied by 15 ampere steps to 60 to 200 amperes.

Ask the G-E sales office nearest you for complete information on your electric welding requirements.

**General Electric Company**
Schenectady, N. Y.
Sales Offices in all Large Cities

# "It recommended itself on account of its lightness"

—writes a user of the AW Arc Welder. "It is the lightest machine for doing this type of work that we know of, and for the use to which we put it this lightness is a distinct advantage on account of the number of set-ups per day over a considerable stretch of track.

"It has been in service about a year and has performed its work very satisfactorily. We use it on maintenance work where the bonds to be applied are more or less scattered—and with two men put on 60 to 70 bonds per day."

Just hook the Type AW Arc Welder to a trolley wire and you get service that satisfies.

*Light weight—easily handled*

GENERAL ELECTRIC

New York, Saturday, December 27, 1924

# Electric Railway Journal

*Consolidation of Street Railway Journal and Electric Railway Review*

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

*Volume 64*
*Number 26*

## Modern Cars Again Prove Their Worth

THE substitution of modern light-weight cars for older and heavier rolling stock on interurban lines of the York Railways and the Johnstown Traction Company in Pennsylvania is told of elsewhere in this issue. Not enough time has yet elapsed since the new cars were put in service to permit an exact calculation of the resultant savings in energy, maintenance, and track costs. But already it is evident that substantial reductions in operating expenses will follow from this modernization of equipment. In addition, the greater popularity of the new cars with the general public is an important consideration.

The experience of these railways is in harmony with that of a number of other interurbans, among which might be mentioned the Kentucky Traction & Terminal Company, the New Haven & Shore Line, and the Aurora, Elgin & Fox River Electric Company. In these and many other cases, modernization of equipment has resulted in reduced expenses and increased revenue.

Under the circumstances it is discouraging to observe the tenacity with which some other interurban railways cling to their old, heavy cars. Faced with rising costs as well as serious competition from the private automobile, they make a great mistake in keeping these antiquated vehicles in service.

"The public is used to these cars and prefers them to the modern, light-weight type," is a frequent argument. In reality, of course, the public would much prefer new cars. Something new always appeals to the popular fancy. That is a large factor in the popularity of the motor bus—it is new. The superiority of the modern car in appearance and comfort is so marked that it is sure to be appreciated.

Some interurban railways claim that they cannot afford to modernize their rolling stock. If it will mean reduced costs and increased traffic, however, such railways are the very ones that can least afford to neglect modernization—and such improvements can be financed.

## Specialized Training Required for Publicity Work

A GOOD many laymen think that they understand thoroughly all the problems of the transportation business. In fact, some of them appear to believe they know more about it than do the men who have made it their life work. Yet experience has shown that very often the theories of the butcher, the baker and the candlestick maker fail when put to the test of actual performance.

Railway men are quite familiar with the fact that difficult problems require trained men to handle them. Probably in no other industry has there been a more pronounced tendency and need to utilize the services of specialists in their various lines. This necessity is hardly less compelling in railway publicity work than it is in the engineering department. The successful publicity man must be a specialist in human nature, and must understand the psychology of "the man on the street."

Often a slight change in the wording of a sentence will altogether change the impression it creates. A good example of this is furnished by a suggestion coming from Major J. S. S. Richardson, chairman of the Pennsylvania Public Service Information Committee. He urges that the phrase "educating the public" be avoided and in its place the phrase "informing the public" be used. The general public believes that it is already sufficiently educated, and does not want any more education handed out by the railway. The word "informing," however, causes no such unpleasant reaction.

While it might never occur to a railway executive whose mind is filled with operating problems, this suggestion is so reasonable that it is necessary only to hear it to realize that it is good. Coming, as it does, from an experienced publicity man, it serves to emphasize the value of having a specialist handle the work of that department.

## Maintenance Shop Practices Will Bear Close Study

IN THE issue of last week was published an article describing some of the many dies and jigs developed by the Chicago Surface Lines to reduce the cost of frequently repeated operations in the shop. This is an excellent example of what can be accomplished by consistent development of such tools.

On many electric railways, along with the tendency to provide insufficient machine equipment, there is also an inclination to overlook the possibilities of applying modern production methods to maintenance work. In some cases special tools enable existing machine equipment to be utilized for a much wider range of work. A good example of this is the ingenious device described in the Chicago article, by means of which an ordinary punch press is made suitable for punching holes from center punch marks in light structural members.

Railway shop machines and tools should, however, not be diverted from the maintenance functions for which they were intended, to the manufacture of parts and equipment that can be purchased more economically from manufacturers specializing in the production of such parts. In most cases this practice of manufacturing parts in the shop is uneconomical. It frequently may appear that some saving is being made due to the

use of machines which are already available, but manufacturing operations in the shop are likely to tie up these machines when they are needed for maintenance work. In addition, there is a decided tendency among electric railways to hold down the shop supervisory staff to a minimum. In general, therefore, the entire attention and available time of such men is hardly sufficient for the proper supervision and improvement of purely maintenance methods and practices. When their attention is diverted into purely manufacturing operations, maintenance is bound to suffer. Under such conditions, any small apparent saving in the cost of new parts is more than offset.

When repair parts for apparatus that has been discontinued by the manufacturer are required, the practice of making them in the shop sometimes is justified. Under these conditions the parts are usually used in such small quantities that the cost of having them made up special by the manufacturer who no longer carries these parts in stock is too high. As pointed out in the Chicago article, time of delivery also becomes an important factor in determing the procedure to be followed.

This phase of the subject will bear much more thorough study and analysis than it has been given in the past. There is an excellent prospect of reducing in a substantial degree the amount of such special manufacturing work done in the shop. This can be done by a consistently maintained practice of standardizing the many miscellaneous parts and fittings used on cars.

Desirable results can be obtained both in the purchase of new equipment and in the substitution of general standards for many different parts already on the cars, as they come through for repairs. In many cases there is abundant opportunity to eliminate many slight differences in sizes and types, which tend to result in small quantity purchase orders, delays in delivery, and high prices. Thus in many instances where parts are being manufactured in the shop because of high purchase prices, careful grouping and weeding out of obsolete types would result in a much reduced stock list and would allow the size of individual orders to be increased to a point that would command attractive prices.

## Train Up a Child in the Way He Should Go

HABIT is stronger than nature, according to an old proverb, and it is a tremendous undertaking to try to change the habits of a nation. Yet this must be done if reasonable individual safety on the streets of our large cities is to be had. Automobiles have completely changed the conditions under which these streets can be used without injury to life and limb. With slow-moving horse traffic there was no call for drivers to be licensed, and there was no great risk when pedestrians crossed the street between corners. With swiftly moving motor vehicles in crowded streets, the need for both careful licensing of drivers and control of pedestrian movement is evident.

Naturally the question of the best way of educating the public to the modern needs of safety in the streets occupied a prominent place in the conference on street and highway safety, held in Washington the first part of last week. The greater part of the report of the committee on education was devoted to methods for teaching the rising generation what should be done. Some suggestions are given as to the ways for reaching adults, and newspapers, posters, movies and the radio are mentioned. But evidently, as pedestrians, adults are expected to know what to do or else to be beyond salvation. It is hard to convince a man who for many years got on and off moving street cars that the closed platform is a good thing, or that it is unsafe to thread his way between crossings through a maze of moving automobiles. But the case is more hopeful with children, to whom a horse is almost a relic of a past age. Proper stress is laid in the report on interesting youth in safety by active participation in it, as through schoolboy patrols and junior safety councils, just as physics and chemistry are taught by laboratory methods. With the children taught there is hope for the elders through precept and example, because in many cases it is very true that the child is father to the man.

## Protecting Transportation for the Sake of the Public

SOMEHOW transportation service lies closer to the heart of the average man than does the service rendered him by any other utility. He is more jealous of his rights as a patron of the trolley company than he is of his rights as a customer of the electric company. For this reason, where railway rates or service are concerned, he is particularly critical of the work of the public service commission. Nevertheless, rising costs of labor and material, as well as the increasing competition of the private automobile and the bus and truck have made the problem of maintaining the financial stability of the necessary transportation systems a grave one. Commonly, therefore, the public service commission is indeed between the devil and the deep sea.

For example, if an application is made by an independent bus operator to run over a route where his service will duplicate that of an existing railway, a regulatory body would ordinarily refuse to grant it. But it is difficult for people to understand why the commission should thus deprive the people of a service which would be a convenience for them. They feel that if some one is willing to provide the service he should be allowed to do so, and they are inclined to regard the refusal of a permit under such circumstances as an act of favoritism to the railway. In order to attain the best results in the end, however, it is necessary often more or less to disregard the immediate effect on the public temper.

To the credit of the commissions it must be said that decisions are made after careful investigation by experienced men. If the outcome is sometimes displeasing to the railway, usually the company is nevertheless willing to admit that it was made in good faith. The public, on the other hand, is too ready to question the motive of the commission. This is no doubt due to a lack of understanding of the consideration upon which the decisions are based. When the people through longer experience, become more familiar with the methods of regulatory bodies and realize that the latter must protect the transportation systems for the sake of the public as well as for the sake of the stockholders, they will probably come to repose a greater confidence in the wisdom of these decisions. This points to the need for more informative publicity along these lines.

# Boston "L" Woodworking Shop Uses Individual Drive

*Third Article*

**A Great Variety of Equipment Is Installed for Car Repair Work in New Everett Shops—Machine Shop Is Temporarily Housed in the Wood Shop—Method of Stripping and Rebuilding a Car Described**



Noteworthy Features of the Wood Mill Are the Individual Motor Drives for All Tools and the Suction Dust Collecting System

THE section of the new Everett shops of the Boston Elevated Railway now used as a carpenter shop and wood mill presents a good illustration of individual motor drive. Induction motors are used mainly, operating on a three-phase, 60-cycle, 550-volt circuit. The various tools installed also show advanced practice in safety engineering. The accompanying table, which lists the principal motor-driven machines in the shops, indicates that there is a greater variety of machinery than ordinarily has been available for car repair work on electric railways.

The many woodworking processes at the Everett shops can in general be divided into two classes: (1) Repair jobs on rolling stock, and (2) production of materials or parts used in quantity by the company in any branch of its service. Ample facilities for quick repair are afforded by the trackage in this building and its connection with the transferway. Most of these tracks are carried at least two-thirds of the way across the building. To facilitate the work until future craneways are available two body hoists built by the company and a jib crane are installed in the northern portion of the shop.

The latest types of equipment of the mill include a rip saw, doweling machine, belt sander, high-speed shaper and a disk sander. These embody various features of design which increase the convenience of operation, render the work safer and reduce obstruction to the movement of men and materials in the mill. Several of the motors are mounted inside the machine frames or above the floor level and out of the way of the user. Control equipment is located as a rule within easy reach of the machine operator, and a general scheme of screening these tools and their drives adds to the safety of the installation. All tools above 7 hp. have General Electric switches, by which the compensators can be "killed" in connection with repair work. While the operations performed by these machines and other equipment were carried on to some extent in the older shops of the company, with this later equipment more rapid production is possible through easier settings of cutting devices, more automatic regulation of processes, multiple cutting and higher powered tools.

Some of the articles regularly made in the wood mill are cross arms, third rail shoe beams, seats for trainmen, surface car life guards, feeder switch boxes, track switch parts, toilet sets for stations, office furniture, trolley planks, car flooring and car doors. Repairs to cars brought into the shop on account of collisions or other accidents naturally take precedence over routine manufacturing operations.

Illustrating the routing methods followed attention





## Conveniences for Wood Work in Boston "L" Shops

No. 1. Three-roll sander *(FF)*.

No. 2. Disk sander *(GG)*.

No. 3. Saw set and filing machines for band and circular saw *(II)*.

No. 4. Suction sweeper intake pipe for removal of floor refuse.

No. 5. The sawdust and shavings exhauster and collector.

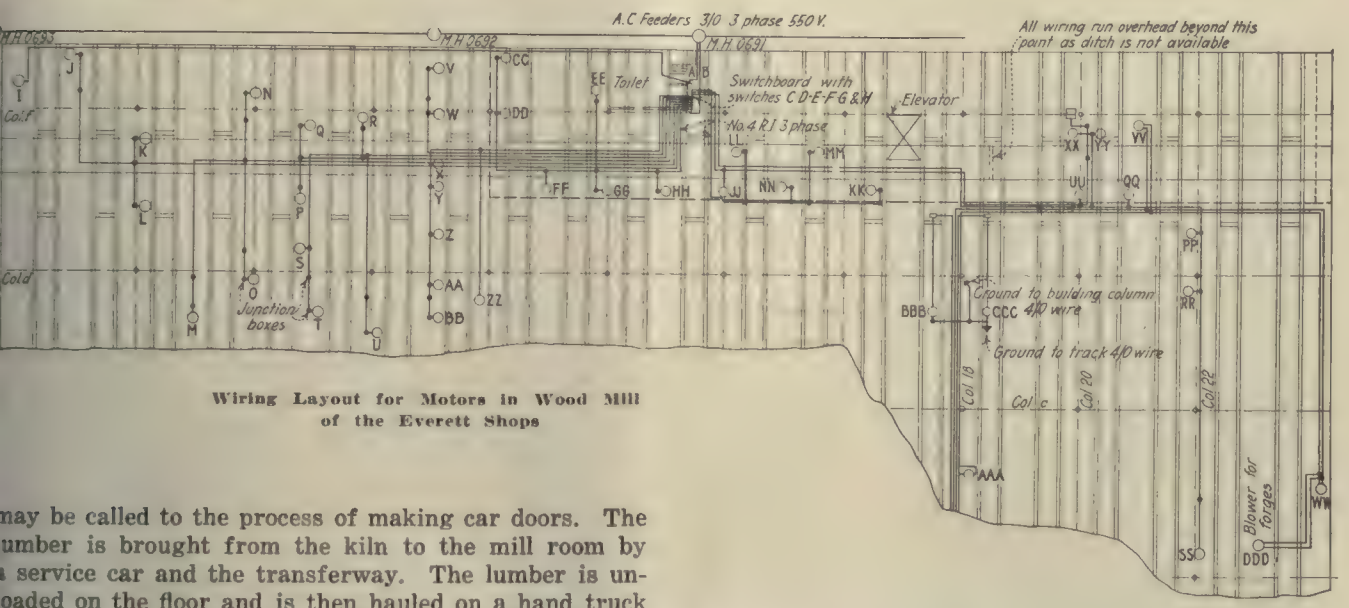
No. 6. An overhead mounting is used for the motor-driven blower of the sawdust removal system.












**Wiring Layout for Motors in Wood Mill of the Everett Shops**

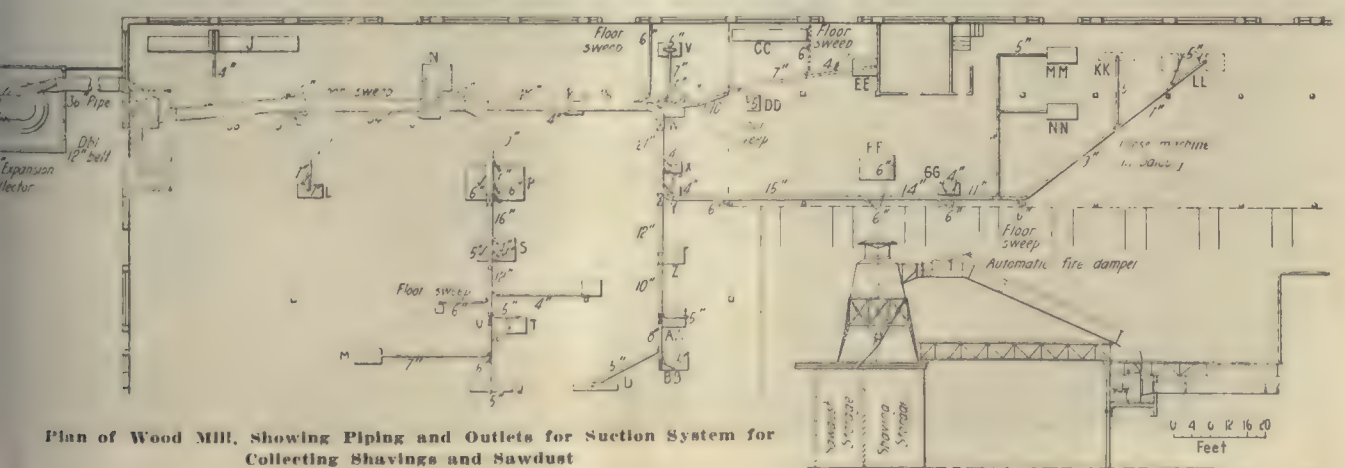
may be called to the process of making car doors. The umber is brought from the kiln to the mill room by a service car and the transferway. The lumber is unoaded on the floor and is then hauled on a hand truck o the cut-off saw (*J*), where it is cut into lengths. It is next trucked to the rip saw (*K*) and cut into the desired widths. Thence it goes to the buzz planer (*Q*), where it is finished in two passes. The next machine used is the molder (*S*), which cuts the stock to the proper sizes. The stock then divides, the door stiles going to the mortiser (*Y*) and the rails to the tenoner (*X*). The stiles then pass to the shaper (*V*) for molding and thence to the carpenter shop in the balcony. The rails are also molded by this shaper and are then passed to the bevel saw (*AA*) for "relishing," after which the rails go to the balcony for assembly with the stiles. The door panels when glued together start with the cut-off saw (*J*) and pass through the buzz planer (*Q*) to the mortiser (*Z*), thence to the bevel saw (*AA*) for bringing to size, on to the sander (*FF*) and to the balcony for assembly. The doors are then taken to the mill room floor and edge-straightened in a buzz planer (*Q* or *U*). Next they are cut to the proper length and width on the bevel saw (*AA*), after which the sander (*FF*) is used, the edges are molded by the shaper (*V*), and the doors trucked to the paint shop. They are returned to the mill room for glazing. The beading is cut up in the rip saw (*J*), passes through the molder (*S*) to the paint shop and is returned to the mill for insertion at the time the glass is set. The completed door then goes to the paint shop for installation.

Window sash goes through practically the same operations as the doors. Steel paneling is largely replacing the wooden panels on the company's cars and this work is done in the temporary machine shop section of the wood mill, in the main.

### Disposing of Wood Waste

The mill building is equipped with a dust and shavings removal system by which all sawdust and other débris are drawn by suction through branch piping into a heavy discharge main leading out of the building and across a bridge to a separating hopper on the top of the extension of the lumber storage building. An accompanying drawing gives the sizes of the various intake pipes leading from the various woodworking machines to the main collecting duct. The piping is supported on the trusses and columns of the building by wire guys and straps. On a balcony in the southwest corner of the wood mill is an 80-in. Sturtevant exhaust fan, belt driven by a 50-hp. motor. A suction of 2½ in. of water is produced when the fan is running at full speed.

The dust and shavings are drawn from the machines and forced into a 36-in. trunk duct. They are discharged into a 36-in. collector with top and body of No. 18 and cone of No. 16 galvanized steel, carried on top of the baling house by structural steel supports. The hopper is about 18 ft. high and 12 ft. in diameter and is fitted with a ¼-in. mesh screen by which the sawdust and shavings are separated to discharge into compartments below where baling takes place in a 7.5-hp. Trojan baling machine. The bales of shavings,




**Plan of Wood Mill, Showing Piping and Outlets for Suction System for Collecting Shavings and Sawdust**

## Some Special Woodworking Tools

No. 1. Vertical boring machine *(O)*.
No. 2. Double surfacer *(L)*.
No. 3. Routing machine *(W)*.
No. 4. Cut-off saw *(J)*.
No. 5. Belt sander *(EE)*.
No. 6. Tenoner, five motors *(X)*.
No. 7. Hollow chisel mortiser *(Y)*.











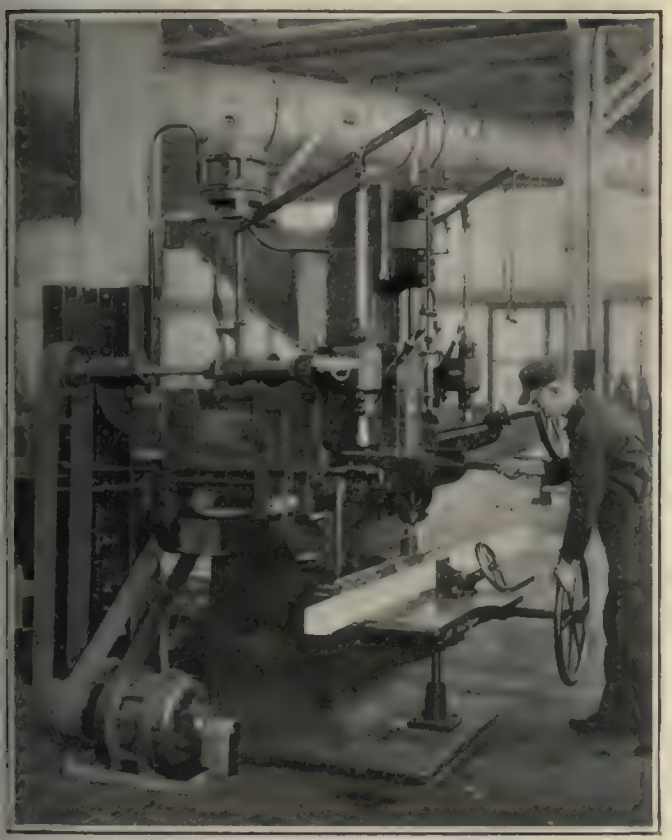


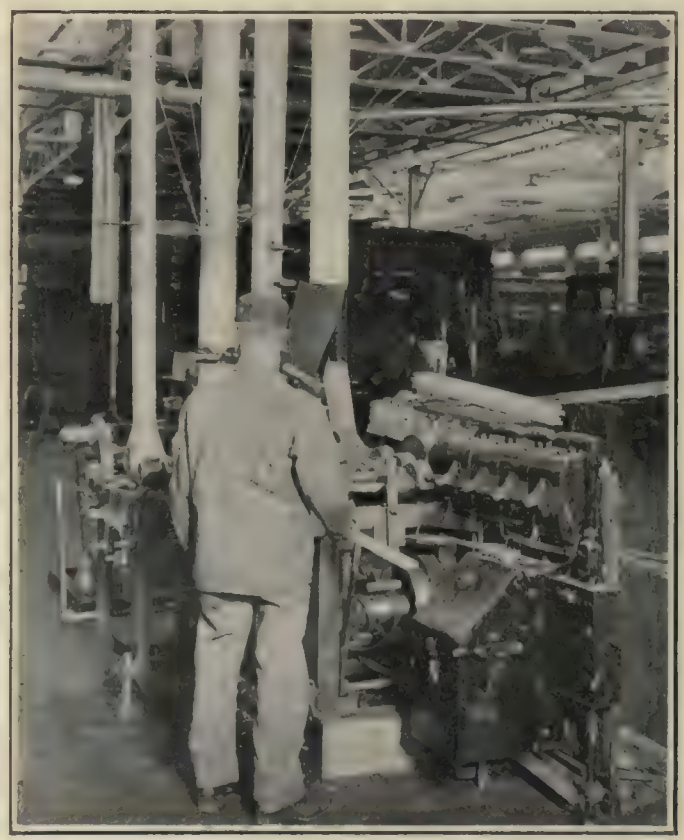


weighing about 80 lb. each, are sold to jobbers. Sawdust is bagged and sold.

A feature of the dust removal system is the installation of floor sweeps with suction openings at the floor level. These connect with the exhaust piping by 6-in. risers having dampers to reduce power requirements when the sweepers are not in operation. Each sweep has an orifice 2½ in. high and 15 in. long. The arrangement is shown in Fig. 4, page 1066.

The wood mill balcony also contains an upholstery shop, cabinet shop and locker room. On the ground floor is a stockroom for miscellaneous hardware used in car repairs and in the temporary machine shop. A temporary brass room also has been provided in the machine shop beyond the stock room. The upholstery shop chiefly repairs curtains, automobile cushions and canvas, there being few if any cushioned seats in the Boston cars.





At Left—Boring and Mortising Machine (N). At Right—Molder Equipped with Five Motors (S)

## Construction of the Building

The shop buildings are of concrete construction up to and including the first floor, with brick walls and steel sash, steel-supported roof, wood plank and Pond type skylights. The foundations are laid in soft ground. In the design of the roof particular attention was given to secure the maximum amount of daylight. In general the construction of the mill building and paint shop is uniform, although the woodworking shop is somewhat narrower. The skylights were designed with the lower half stationary and the upper half movable to give efficient ventilation. The operating sides are movable portions, are motor-driven and controlled by push-buttons from the ground floor. A run of 150 ft. represents the maximum which can be conveniently handled in a single section.

The wood shop has 22 tracks and a capacity of 36 cars of 50 ft. length. Pits are provided for 17 tracks. The entire floor of the building is paved with treated wood blocks. The southwest portion of the wood mill is used for general heavy woodwork and the northerly portion of the building is temporarily utilized for blacksmith, tin and machine shops, pending the construction of the metal-working shop north of the present building.

The finished floor was laid over the foundation after the rails were installed and the pits were constructed with a reinforced-concrete foundation. The pits are 4 ft. 7 in. deep from the top of the rail to the pit floor, with offset walls. The pit tracks are laid on tie plates anchored to the concrete and spaced on 24-in. centers, the rails being fastened by standard rail clips spot welded. A small amount of heat is available in the pits, pipe coils being run in the offset on one side. Light outlets are installed on the other side, with extension cords hung up so that they will be out of the way when not in use.

The transfer table, which was built by George P. Nichols & Brothers, Chicago, has a speed of 6⅔ m.p.h. and a weight loaded of 100 tons. It was found that it would be a considerable undertaking to provide a suitable bumper which would stop the table without damaging it, and so the engineers of the railway company installed a so-called natural bumper, with a slope of 30 deg., built of cinders covered with 6 to 8 in. of crushed stone. This has proved satisfactory, as the table will run into it without derailing and apparently without injurious result, either to the table or to the end wall of the transferway.

An Elwell-Parker 3,000-lb. industrial electric crane truck is used for many services about the shops, particularly in handling electric motors and other parts to and from the temporary machine shop, in moving

trailers on and off the transfer table and spotting cars on tracks.

At present 373 men are employed at the Everett shops.

### ROUTINE OF HANDLING CARS NEEDING REPAIRS

When a car inspector, with the approval of a district supervisor, has sent a car to Everett it is placed on a side track to await inspection so as to determine just what repairs are needed. These often exceed the recommendations of the transportation department, as rotted sills and posts cannot be seen until the sheathing is stripped off and the frame exposed. When a berth in the shops becomes vacant, the next car scheduled for repairs is transferred from the yard to this berth.

As soon as a crew of men has completed another car, they are assigned to the one just placed in the shop. Their first duty is to strip the car unless it is one that has been painted comparatively recently and has just been involved in an accident. In this case the needed repairs are made, the paint is retouched and the car released. About 225 cars per year are sent into the shops on account of collisions.

When a car is stripped all window screens are removed, transferred to the machine shop for repairs and thence delivered to the paint shop for cleaning and dipping. Sash and doors are removed and sent to the sash and door department. The door-operating mechanism is taken down and thoroughly overhauled. Seats and backs are all put in first-class condition and sent to the paint shop for cleaning and repainting. The seat frames are all gone over and any found defective are removed and repaired. Metal and brass hardware is

MOTOR-DRIVEN WOOD MILL MACHINES IN EVERETT SHOPS, BOSTON ELEVATED RAILWAY

| Ref. Letter | Description of Unit | Manufacturer | Motor Hp. | Motor Manufacturer | Motor Type | Motor Rpm | Control Information |
|---|---|---|---|---|---|---|---|
| *I* | Plower, sawdust, 80-in. | Sturtevant. | 75 | G. E. | KT 343 | 1,200 | CR 1,034 G. E. |
| *J* | Cutoff saw No. 6 | American | 7.5 | G. E. | KT 302 | 900 | CR 1,034 G. E. |
| *K* | Rip saw No. 386. | Fay & Egan. | 10 | Watson | KH | 3,400 | D 3,783 Industrial Controller Company compensator |
| *L* | Double surfacer No. 140 A. | Fay & Egan. | 10 | L. Allis | KH | 3,400 | Louis Allis |
| | | | 15 | L. Allis | KH | 3,400 | Louis Allis |
| *M* | Band saw, 42-in. | Fay & Egan. | 10 | G. E. | KT 752 | 1,800 | Allen Bradley, KC, form E |
| | | | 5 | G. E. | Form C | 1,800 | Allen Bradley, auto starter |
| N | Car mortiser | Greenlee | 10 | G. E. | Form C | 1,800 | Allen Bradley, form E, KC |
| | | | 3 | G. E. | Form C | 1,900 | Allen Bradley, auto starter |
| *O* | Spindle borer. | Greenlee. | 4 | G. E. | Form D | 3,600 | CR 705 G. E., magnetic switch, push button |
| *P* | Inside molder, 13-in. | Rogers | 25 | G. E. | Form B | 900 | KC form E, G. E. |
| *Q* | Hand planer No. 506. | Fay & Egan. | 5 | F. & E. | Lightning | 3,600 | Westinghouse, WK 20 |
| *R* | Band saw No. 50 | Fay & Egan | 5 | G. E. | | 1,800 | G. E., CR 1,038 |
| | | | 5 | Watson | KH | 3,400 | G. E., CR 1,038 |
| *S* | Molder No. 600. | Fay & Egan. | 3 | L. Allis | KT 730 | 1,800 | G. E., CR 1,038 |
| | | | 3 | L. Allis | CT form A | 3,400 | G. E., CR 1,038 |
| | | | 3 | L. Allis | | 3,400 | G. E., CR 1,038 |
| *T* | Universal saw No. 30 | American | 7.5 | Watson | KH | 3,400 | D 3,783 Industrial Controller Co. |
| | | | 5 | G. E. | Form C | 1,800 | CR 1,038 G. E. |
| *U* | Buzz planer, 16-in. | Rogers | 3 | G. E. | KT 731 | 3,600 | Allen Bradley J 1,552, push button |
| | | | 5 | F. & E. | Lightning | 6,800 | CR 1,038, G. E. |
| *V* | Shaper No. 452 F. | Fay & Egan. | 5 | F. & E. | | 6,800 | CR 1,038, G. E. |
| | | | 10 | G. E. | KT 751 form C | 1,800 | CR 1,034 |
| *W* | Tenoner No. 2. | Houston. | 7.5 kw | L. Allis | (Generator) | 1,800 | |
| | | | 5 | G. E. | KT 752 form C | | Allen Bradley, J 1,552 |
| *X* | Tenoner No. 505 | Fay & Egan. | 3½ | F. & E. | KT 28 form D | 3,600 | CR 1,038 G. E. |
| *Y* | Mortiser No. 510 A | Fay & Egan. | 2½ | F. & E. | KT 16 form D | 3,600 | CR 1,038 G. E. |
| *Z* | Cabinet surfacer No. 156. | Fay & Egan. | 1 | F. & E. | CT form A | 3,600 | CR 1,038 G. E. |
| | | | 10 | F. & E. | KH form A | 3,400 | L. Allis D 3,783 |
| *AA* | Bevel and miter saw No. 22. | Pettingell. | 5 | G. E. | KT 752 | 900 | G. E., CR 1,038 |
| *BB* | Universal wood worker | Fairbanks | 5 | G. E. | KT 731 | 1,800 | |
| *CC* | Patternmaker's lathe No. 441 | Fay & Egan. | 3 | Watn. Elec. | KT 730 | 1,800 | G. E., CR 1,038 |
| *DD* | Chamfering machine No. 294. | Fay & Egan. | 5 | G. E. | KT 731 | 1,800 | G. E., CR 1,038 |
| *EE* | Belt sander No. 6. | American | 2 | G. E. | KT 731 | 1,200 | G. E., CR 1,038 |
| | | | 1-7.5 | Watn. Elec. | KT 751 | 1,200 | |
| *FF* | Three-roll sander No. 393. | Fay & Egan. | 1-7.5 | Watn. Elec. | KT 952 | 1,200 | 2 CR 1,034 |
| | | | 1-3.0 | Watn. Elec. | KT 750 | 1,200 | 2 CR 1,038 |
| | | | 1-5 | Watn. Elec. | KT 752 | 1,200 | |
| *GG* | Disk sander No. 446 | Fay & Egan. | 1.5 | "Superior" | | 1,200 | CR 1,038 G. E. |
| *HH* | Grindstone. | American | 1 | G. E. | KT 711 | 1,800 | CR 1,038 G. E. |
| *II* | Saw sharpeners. | | | | | | |
| | Circular and band saw. | Wardwell | | Robbins & Myers | | | |
| *JJ* | Knife grinder No. 101 | American | 2 | G. E. | KT 713 | 1,800 | CR 1,038 G. E. |
| *KK* | Buzz planer, 16-in. | | 3 | | | | |
| *LL* | Universal saw. | American | 5 | | | | |
| *MM* | Saw. | Fairbanks | 5 | G. E. | KT 936 | 1,800 | J 1,552 Allen Bradley |
| *NN* | Doweling and rod machine No. 7. | Fay & Egan. | 5 | G. E. | | 1,800 | CR 1,038 G. E. |
| | | MACHINE SHOP | | | | | |
| *PP* | Squaring shears 8 E. | Niagara | 7.5 | G. E. | KT 952 | 1,200 | G. E. auto-compensator |
| *QQ* | Punch No. 36 | Niagara | 3 | G. E. | KT 938 | 1,200 | CR 1,038, G. E. |
| *RR* | Power rollers. | | 3 | G. E. | KT 732 | 1,200 | CR 1,038 G. E. |
| *SS* | Hammer No. 1066 | Nazel | 7.5 | G. E. | KT 952 | 1,200 | CR 1,034 G. E. |
| *TT* | Circular shears No. 208 A. | Niagara | 3 | G. E. | KT 938 | 1,200 | CR 7,005 G. E., magnetic switch |
| *UU* | Emery wheel. | U. S. Electric Tool Company. | 3 | G. E. | KT 731 | 1,800 | CR 7,005 push-button control G. E. |
| *VV* | Shop shafting | | 10 | G. E. | RC-9 | 1,250 | Type 2,102 monitor control |
| *WW* | Shop shafting | | 30 | | | 875 | Old d.c. motor, 550 volts, trolley supply |
| *XX* | Buffer. | U. S. Elec. Tool Co. | 5 | G. E. | KT 731 | 3,600 | CR 7,005 push-button control G. E. |
| *YY* | Buffer. | U. S. Electric Tool Company | 5 | G. E. | KT 731 | 3,600 | CR 7,005 push-button control G. E. |
| *ZZ* | Saw. | American | 5 | | | | |
| *AAA* | Crane hoist. | Shepherd 5-ton | 6 | | | | D. C. motor |
| *BBB* | Car body hoist. | | | G. E. 58 | | | |
| *CCC* | Car body hoist. | | | G. E. 58 | | | |
| *FFF* | Emery wheel. | | 1 | Westinghouse | ES 8,731 | | Westinghouse WK 10 starter |

MISCELLANEOUS EQUIPMENT

16 Heater blower motors, G. E., 5 hp., type KT 731, conduit type N 4 control.
1 15-kw. Fairbanks-Westinghouse-Crawford electric oven in wood mill.
2 Pump motors, 3 hp., 900 r.p.m., 550-volt, conduit type I starting switches.
Window sash mechanism, 16 G. E., KT 22-hp. motors; Fairbanks-Morse RC 4 starters.
2 Salem electric elevators, each with 30-hp. G. E. MT 332 motor and Cutler-Hammer control.
1 32-kw. Crawford-Westinghouse electric oven, ½-hp. blower motor.
1 7.5 Crawford-Westinghouse electric oven, Westinghouse type F magnetic contactor.

all removed and sent to the brass room for cleaning, repolishing and lacquering. If the car is old and shows indications of rotten framing it is further stripped of all outside sheathing and possibly the floor is removed.

From this point the rebuilding begins. All rotten portions, such as posts and framing, are removed carefully and sent to the mill, where exact duplicates are made, this being found more economical and quicker, with the modern machine tools available, than the old method of trying to fit new parts to the car at the repair track. The original timbers are cut in many ways to fit the contour of the car and to allow clearance for rivet heads, bolts, angles, etc. Sheathing plates, if badly corroded or bent, are sent to the sheet-metal department to be straightened or duplicated. Bumpers, if badly bent, are taken off, reheated and are then reshaped.

Gradually every part removed is returned to the car renovated or duplicated, the framing is replaced and spliced, the car resheathed, the floor laid and every detail gone over and made good. The doors and windows are put in and the car sent to the paint shop. There the final trimming of hardware is replaced, seats are put in and window screens are attached, glass cleaned and the final trimming is done just before the car is sent out.

# Boston-Lowell Buses Run Express

**Parlor Car Service Recently Established by the Eastern Massachusetts Street Railway on this 27-Mile Route Supplements the Rail Service Between These Cities**

EXPRESS bus service or, as the railway prefers to call it, motor coach service between Boston and Lowell was inaugurated by the Eastern Massachusetts Street Railway on Oct. 1, 1924. To a certain extent this service takes the place of a street car route which was abandoned some time ago because of poor patronage. It serves also to supplement the service on an existing car route which is operated from Boston to Lowell via Chelsea. In order adequately to take care of local passengers it is necessary to make all stops along this line, and for that reason the company felt that it would be worth while to undertake express bus service for the through passengers between the two cities.

Park Square, Boston, is the southern terminus, and from there the route goes out Charles Street across the Charles River and then via Cambridge Street to Massachusetts Avenue, just beyond Harvard Square. Then it follows what is known as the "back road" to Lowell. This highway has recently been repaved by the State of Massachusetts. By following these streets from Boston through Cambridge the traffic congestion on the more popular streets is avoided and considerable time is saved.

The route is 27 miles long and the running time is approximately 1 hour and 10 minutes. This is slightly more than the ordinary running time of trains on the Boston & Main Railroad between these cities, and is considerably longer than the time of express trains. On the other hand, the fact that the buses start from the convenient Park Square terminus in Boston and reach a convenient point in the center of Lowell makes this service more attractive in that respect than the railroad service, which starts from and arrives at stations less centrally located. The fare on the bus is $1 and on the railroad 93 cents. At both ends of the line illuminated signs made of wire glass have been conspicuously placed on electric light poles to inform the public concerning the service.

### Terminals Are Conveniently Located

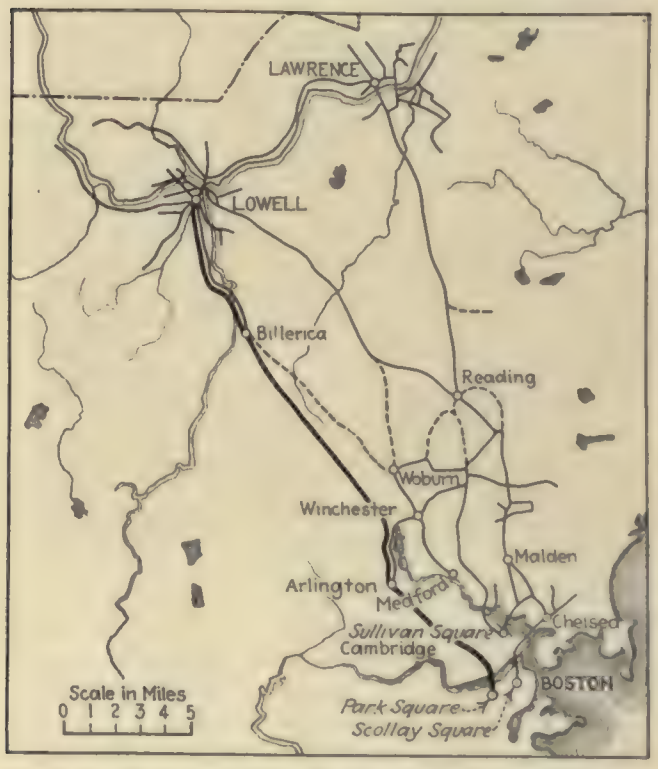
When this operation was first undertaken ten round trips were run per day, the first leaving Lowell at 7.30 a.m. and the last at 9.30 p.m. Leaving Boston the first trip was at 9 a.m. and the last at 11:15 p.m. Traffic has varied greatly from day to day, ranging between about 300-passengers as a minimum and 600 passengers as a maximum. For the first six weeks after the commencement of bus operation an uninterrupted period of fair weather prevailed. Saturday, Sunday and holiday riding has been heavy. Recently the increase in the number of passengers carried caused the railway to increase the service. On Nov. 8 an hourly headway throughout the day was established in both directions.



Express Bus Operated by the Eastern Massachusetts Street Railway Between Boston and Lowell Loading Passengers at the Park Square Terminus

Because the running time in each direction is slightly more than an hour, the company thought that it would be undesirable to try to operate an hourly headway with only two buses. For that reason three buses are now in service all day, with fairly long lay-overs at the ends of the line. By starting the trips from Lowell on the even hours and from Boston on the half-hours the lay-over time has been divided equally between the two places.

Five Fageol coaches are available for this service. On Saturday afternoons, however, when important football games were being played in Boston, it was necessary to augment the service by the use of street car type buses, borrowed from other routes operated by the railway. A plan is under consideration at present to increase the seating capacity of the Fageol coaches from 24 to 30.




Two Routes Are Operated by the Eastern Massachusetts Street Railway Between Boston and Lowell. Trolley Service Is Via Chelsea, While the Express Bus Service Operates Through Cambridge

The buses are maintained in a space specially set aside for that purpose in the carhouse at Lowell. An experienced automobile mechanic is employed to take care of them. Ordinarily each bus is inspected every third day, or at the end of approximately 600 miles of operation.

Part of the route, which is shown on the accompanying map, is on streets where the Boston Elevated Railway operates surface cars. Another part is on streets where the Eastern Massachusetts company operates. This will simplify the problem of snow removal in winter because the railway snow-fighting equipment can clear a considerable portion of the bus route. The stretch of road where the railway plows cannot operate is only a few miles in length. This being a state highway it is expected that the state will keep it clear. In an emergency, however, the railway is prepared to clear a path for its buses by means of snowplows on its heavy motor trucks.

In accordance with the laws of Massachusetts, the permit for the operation of this line is of only one year duration. Such short term license, however, is not the serious disadvantage to a bus line which it would be for a rail line. The company feels that there may be room for the establishment of similar routes in this territory. In general, however, it is thought that the replacement of railway lines by bus lines has already proceeded in Eastern Massachusetts about as far as it is likely to go.

# Giving the Riders Somewhere to Go*

**Charleston Consolidated Railway & Lighting Company Leased an Amusement Park and Made a Profit of Nearly 120 per Cent in Two Months**

AT ONE time the comment was often heard concerning the street railway in Charleston, S. C., that "It doesn't take you anywhere." In other words, the various routes linked the business and residence districts together but they reached practically no amusement resorts. There are two parks for white people, but in spite of the great natural beauty which they possess, they have not attracted many pleasure seekers. The railway considered the possibility of converting these parks into sources of traffic for itself, but it was felt that a large majority of the frequenters of the parks were automobile owners and that it was not worth while to try to build up an amusement resort for white people.

With the colored people, however, the situation is different. A property known as Grant Park, located on a suburban line about a mile beyond the city limits, was successfully operated by the railway before the war. In the spring of this year it was decided to negotiate with the owner of this park with a view to its operation during the summer. An agreement was reached whereby the railway paid $250 toward the renovation of the buildings and agreed to furnish music and prizes for dances to be held at the park.

Tickets were furnished by the conductors to colored passengers alighting from the cars at Grant Park. On nights when dances, band concerts, or picnics were held, these tickets entitled the possessor to free entrance. All such tickets collected above 150 in number were redeemable, if presented by the owner of the park to the management of the railway, at 2½ cents each. The first 150 collected each day were used to reimburse the railway for its expense in furnishing music and other entertainment features.

During the first two months' operation the railway carried approximately 8,000 park passengers at 25 cents per round trip, making a total of $2,000. The largest single item of expense to the company was the extra service run to the park. This cost somewhat over $400 and the other expenses brought the total to slightly more than $900. The net profit of the operation was therefore in the neighborhood of $1,100. This experience has convinced the railway that it can profitably increase its park appropriation for another year. It proves, in the opinion of the management, that it pays to give the riders "somewhere to go."

*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

# Many Railway Improvements in Central Pennsylvania

**New Cars, Extensive Track Reconstruction, Better Shop Facilities and Bus Operation Are Among the Recent Developments at Johnstown, Altoona, Harrisburg and York**

*By Spectator*

PENNSYLVANIA is always an interesting state from an electric railway point of view. It has more individual companies than has any other state in the Union and its total electric railway mileage is exceeded only by that of New York. It is particularly interesting, however, on account of the number of up-to-date street railway systems in its moderate-sized cities. Johnstown, Altoona, Harrisburg and York are four such cities, ranging in population from about 50,000 to 75,000 and located comparatively close together in the central part of the state. In all of them important improvements have lately been made in track, shops and rolling stock.



The Center of the Square at York Is Reserved as a Loading Area for Trolley Passengers

Considering the size of Johnstown, which is credited with a population of only 67,327 by the census of 1920, a surprisingly large outlay has been made by the Johnstown Traction Company to improve its service during the last few years. Since the beginning of 1920 more than $850,000 has been expended for track reconstruction and paving. Every year the amount spent for this work has increased, as shown in the following table, which was published in a newspaper advertisment wherein the railway explained some of its problems to the public.

| | |
|---|---|
| 1920 | $105,029 |
| 1921 | 140,721 |
| 1922 | 143,331 |
| 1923 | 222,869 |
| 1924 | 239,520 |

Installation of an extensive new system of sewers in the city has necessitated much of the track reconstruction. This new system is not yet completed and the railway is faced with the necessity of making similar large expenditures for some time to come.

These heavy demands upon the company were one reason for an application filed in the fall of this year with the Public Service Commission for a slight increase in fare. This was put into effect in September. The ticket rate was increased from four for 28 cents to four for 30 cents, or, in other words, from 7 cents to 7½ cents per ride, while the cash rate was increased from 7 cents to 10 cents. There has been practically no opposition to this increase because most people realize the reasonableness of it. One interesting result, however, has been the greatly increased use of tickets. This has grown by leaps and bounds until now 98 per cent of the revenue passengers use tickets. In fact, strangers in the city are almost the only ones who pay the 10-cent cash fare.

The railway is gradually extending the use of one-man cars by rebuilding some of its older rolling stock. In the reconstruction of a number of double-truck cars for one-man operation, the seating arrangement has been altered with a view to encouraging passengers to move to the rear of the car. Formerly these cars had longitudinal seats and were operated with rear entrance and front exit. Now, however, five cross seats have been installed on each side at the back end and the heater has been moved from the middle of the car to the back platform. In place of the old rear entrance door a small emergency door has been provided. On the far side of the rear platform has been placed a semi-circular seat. By this means the total seating capacity of the car has been increased somewhat and it has been found that the universal desire to ride in cross seats causes passengers to move to the rear of the car.

Soon after the completion of a new concrete state road between Johnstown and Windber applications were made by a number of independent bus operators to run over this route. Windber is a mining town of about 12,000 inhabitants. The traction company, however, operates an interurban line between these places, and it was felt that competitive bus operation between the same points would be likely to affect its revenue seriously. Accordingly the railway itself made application to operate bus service over such portions of the route as were not conveniently served by its cars.

At some places the state highway is as much as 3 miles away from the car line and the bus route was laid out with a view to serving the people living in this

district. The railway line goes all the way to Windber, a distance of approximately 12 miles. The bus line, however, stops at Scalp Level, about 9 miles from Johnstown. The company felt that bus operation between Scalp Level and Windber would be only a needless duplication of its existing service.

The bus route begins at the end of the city car line in Dale Boro, as shown on the accompanying map. The fare is 40 cents to Scalp Level, including the fare on the connecting city car line. Inbound a free transfer is given from bus to car. This rate is considerably higher than the fare on the electric line, which is only 30 cents through to Windber. A single bus is operated on a one-hour headway, covering about 200 miles per day. On weekdays the passengers number about 200, but on Saturdays more are carried. On account of the many severe grades in this territory bus operation is expensive and the line shows a considerable loss. Nevertheless this is to be preferred to having independent bus operation on the route.




Bus and Car Routes Between Johnstown, Scalp Level and Windber, Pa.

Two other short bus routes are operated by the company. These are feeder lines into districts not served by the cars. All these bus operations are carried on under the name of the Traction Bus Company. An interesting characteristic of the service is that each driver has his own bus. When a relief is made not only is the operator changed, but also the bus itself. This method, the company has found, results in the driver taking a greater interest in the care of the vehicle. In all, five buses are owned, three of which are in regular service while two are spares.

Railway service between Johnstown and Windber has also been improved recently. Three new light-weight interurban cars were purchased from the Kuhlman Car Company and placed in service during the summer. These cars are operated by two men and the headway is 40 minutes, or slightly shorter than the bus headway. The railway is now considering the purchase of some more new cars.

## CHANGES AT ALTOONA

A striking change is soon to come over the railway situation in Altoona. The color of the cars is to be changed from dark green to cadmium yellow. This will be a great improvement and should have a distinct tendency to encourage riding. Due to climatic conditions and the fact that it is a great railroad center, Altoona often has a rather gloomy aspect. Despite the best efforts of the shop department to keep them fresh looking the dark green street cars blend altogether too well with the murky atmosphere.

In making this change the company is following the precedent which it set when selecting a color scheme for its buses. The buses operated by the Altoona & Logan Valley Electric Railway have a bright red body and a yellow roof. A yellow band encircles the body just below the window. On this the name "Logan Valley" is painted in blue letters.

Like many other and bigger towns Altoona, which has a population of approximately 60,000, is worrying about traffic congestion. A survey of street traffic was recently made by the railway at one of the busiest intersections in the downtown district. This count was made from 8 a.m. to 6 p.m., and it was found that street cars comprising only 7.8 per cent of the total number of vehicles carry 74 per cent of all passengers. The figures for various types of vehicles follow:

| | Vehicles | Passengers |
|---|---|---|
| Autos and trucks | 6,101 | 12,802 |
| Street cars | 556 | 36,000 |
| Motorcycles | 18 | 18 |
| Bicycles | 162 | 162 |
| Horse drawn | 22 | 22 |
| Total | 7,159 | 49,004 |

Expressed in terms of lineal feet of street space occupied, 100 passengers in street cars require 60 ft., whereas the same number in automobiles require 750 ft. Even with the larger traffic carried, the street cars during the 10 hours of the survey occupied less than one-third the street area taken by the automobiles. These data have been presented to the police department for consideration in connection with their study of the traffic problem.





Left—The Scalp Level Bus Meets the City Car Line at Dale Boro. Right—One of the New Light-Weight Interurban Cars Operated on the Windber Line of the Johnstown Traction Company



The Square at Harrisburg. The Railway Here Is Fortunate in Having Rolling Stock of Uniform Appearance

A number of streets in the business district of Altoona are now restricted to movement in one direction. There is some talk of changing the direction of traffic on two of these streets. Such a change would involve rerouting of the cars and the installation of new special work. Along with this it is planned to install a system of interlocked traffic signal lights. Just why the city wants to do this is difficult to understand. The arrangement of streets and traffic conditions at the different intersections are such as to make it practically impossible that interlocked signals would facilitate traffic movement. On the other hand, they would undoubtedly be a considerable hindrance to the 74 per cent of the people who ride in street cars.

In its shops the railway is carrying out a number of important although not spectacular improvements. Some new machine tools that have been installed have given very satisfactory service and it is planned to purchase others. Improvements have been made also in the power house, particularly in the arrangement of switches and control panels. The railway buys power from the Penn Central Light & Power Company, but it maintains sufficient facilities of its own to operate in an emergency. Ordinarily its own power station takes care of the steady, all day load and relies upon the Penn Central to carry the peak.

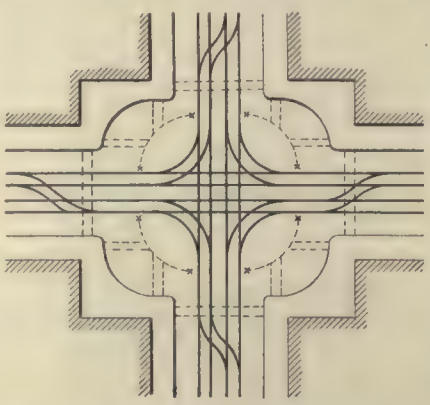
### Pull-ins Reduced at Harrisburg

Probably the most interesting thing which has recently been done by the Harrisburg Railways is the reduction in the number of pull-ins. Since the first of the year the average number of car-miles per pull-in has been increased from somewhat less than 3,000 to nearly 15,000. This has come about as the result of a systematic campaign to determine the reason for every pull-in and to eliminate those causes which were responsible for the greatest number. Much improvement has been effected since the installation of dipping and baking facilities at the shop. These will be described in a separate article in ELECTRIC RAILWAY JOURNAL. A change in the kind of waste used in packing journal boxes was another move which is thought to be responsible for the elimination of many pull-ins.

As at Johnstown, large sums have been expended for track reconstruction. Nearly $250,000 has been spent during the past year for the rebuilding of about 5 miles of track. For most of this work International steel ties were used. Asphalt is used widely for street paving in Harrisburg, and the railway favors a rigid type of track structure.

Here, too, yellow is the color of the car exteriors, but in Harrisburg it is not an innovation as it is at Altoona. The rolling stock is kept well painted and is all more or less uniform in appearance. This results from the fact that the railway was able to secure a considerable number of modern cars a few years ago when prices were lower and all the older cars were retired from service.

Across the Susquehanna River at Lemoyne the Valley Railways has been making improvements, too. Some of its cars have been rebuilt with an arch roof replacing the old monitor deck. Steel plates have been used on the exterior to cover the old wood sides and give the car a more attractive appearance. Rumors are afloat concerning the possible sale of this railway to a holding company, but no definite announcements have yet been made.



City Cars Leave the Central Square at York, Pa., on the Hour and at 5-Minute Intervals Thereafter

In the late fall the York Railways commenced the operation of new light-weight cars on the Red Lion and Windsor line. This is a 13-mile interurban line with single track and turnouts. The running time outbound from York is 46 minutes and inbound it is 52 minutes. There are two reasons for the difference—one being that the inbound route from Windsor to Red Lion is generally uphill, and the other that a 3-minute layover occurs inbound at Red Lion.



An Interior View of the New Interurban Car of the York Railways, Showing the Linoleum Floor Covering and Arm Rests

The cars were built by the J. G. Brill Company and one of them was on exhibition at the American Electric Railway convention at Atlantic City. As delivered by the manufacturer the car weighs 38,962 lb., but the actual operating weight is 39,400 lb. Four General Electric No. 247 motors are used per car.

In general appearance the new cars differ somewhat from any heretofore used by this company. The sides are curved and an arched window has been placed in each corner. The sides of the car are of Plymetl and the roof is of Haskelite. Special pains have been taken to make the interior of the car attractive. The floor has been covered with linoleum and arm rests are provided for the seats. The interior finish is light mahogany and an interesting feature is that all piping, etc., has been painted in accordance with the interior finish to make it as inconspicuous as possible. Seats are on 33-in. centers. Altogether seating accommodations for 52 passengers are provided.

These cars replaced older equipment weighing 55,000 lb. An important reduction has been effected in the energy used. Three cars of this type, enough to equip this line with one to spare, have been purchased. Two similar cars but of smaller capacity have been ordered for use in city service.

In common with many Pennsylvania towns the city of York has a central square, where the two principal business streets intersect. By painting white lines on the pavement and placing stanchions at intervals the city has laid off a circular area in the center where trolley passengers may wait for their cars. All vehicles other than trolley cars crossing the square must follow a circular path around the outside end of the loading area. Vehicular movements are controlled by interlocked electric light signals at each approach. These are so arranged that wheeled traffic stops and goes simultaneously, while pedestrians have the right of way on all crosswalks during the intervals between vehicular movements.

All the car routes of the York Railways reach this square. On one street two city lines operate on a 10-minute headway, giving a 5-minute joint spacing. On the other street three lines operate, each on a 15-minute headway, giving a similar 5-minute service. Schedules have been so arranged that connecting cars meet at the square. Cars discharge passengers before crossing the intersection and then proceed to the far side to load. On the hour and at 5-minute periods after the hour three or four cars leave the square simultaneously in different directions.

On account of the large number of railroad crossings at grade and also because of the comparatively high schedule speed of the street railway, two-man cars are operated on most of the lines. These are single-truck cars weighing 23,500 lb., built by the J. G. Brill Company in 1922. General Electric No. 247 motors are used with 26-in. wheels. The schedule speed is 10.3 m.p.h. and the cost of operation averages somewhat below 30 cents per car-mile. The present rolling stock on these city lines will soon be augmented by the new cars already mentioned.

An interurban bus line from York through Loganville and Shrewsbury to Turnpike has been operated by the York Railways for about a year. Bus operation is carried out under the name of the York Transit Company, a subsidiary of the railway. This company also operates two other bus routes, which have been so poorly patronized that application was made to the Pennsylvania Public Service Commission for their discontinuance, as told in the ELECTRIC RAILWAY JOURNAL for Nov. 29. The results on the Turnpike route, however, have been more encouraging, and up to the present this line has been paying a little more than its operating expenses.

The length of the route is 14.15 miles one way and through fare is 65 cents. For intermediate points, the fare averages between 4 cents and 5 cents a mile. Commutation rates are in effect for those who use the service regularly. On weekdays three round trips are operated, while five trips are made on Saturday and two on Sunday.



New Cars of This Type Have Reduced Energy Consumption on the Windsor Line of the York Railways



New Fageol Bus Loading in Front of the Traction Office at York Before Starting for Turnpike

A new 29-passenger Fageol bus was recently placed in service on this route. Cars of the railway are painted green, but the color scheme of the bus is orange and royal blue, with a gray roof. The reason for the adoption of these colors was the desire to give the vehicle a distinctive appearance and attract public notice. It is expected that with this new bus the operating cost will be lower and that the traffic will be increased.

An outstanding feature of the electric railway situation throughout the state of Pennsylvania is the freedom from cut-throat bus competition. The attitude taken by the Public Service Commission is an eminently fair one. No needless duplication of service is permitted, and the railways have thereby been enabled to improve their facilities to a greater extent than would have been possible if they had been constantly harassed by uneconomic competition. On their part the railways have done much to supply feeder service.

# Work of the Baltimore Mileage Bureau*

**New System Installed Obtains Mileage by Lines, Days, Individual Cars, Etc.—Automatic Tabulating Machines Make Calculation for Any Desired Classification Quick and Accurate**

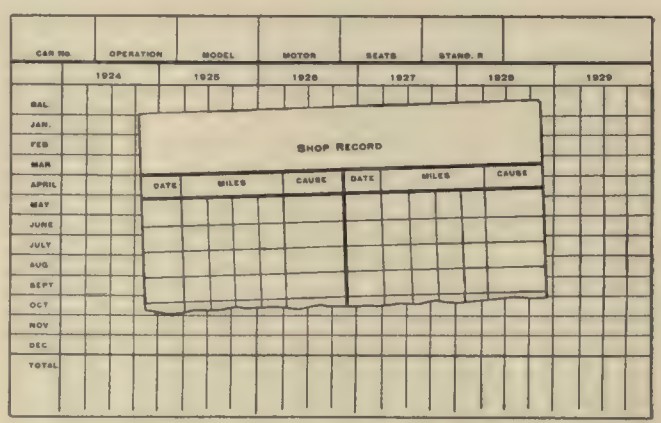
BEING dissatisfied with the accuracy and completeness of its car-mile figures, the United Railways & Electric Company of Baltimore, Md., installed a new system of recording mileage, beginning with Jan. 1, 1924. This was done with the idea of increasing the accuracy of its figures, reducing the bulk of the record, and at the same time making available to the operating department a larger amount of information than it had previously been able to secure.

This company operates approximately 1,500 cars over 35 lines. Each line, however, has a number of runs, a run being defined as a trip over a designated route between designated termini, so that, all told, the system must care for approximately 200 different runs. The total mileage for each of these runs must be determined daily and checked against the schedule requirements. There must also be a monthly and an annual summary of the mileage by runs, by lines, and for the system as a whole, as a general measure of the service that is rendered.

The true measure of service is not so much the car-mile as the seat-mile and also, though to a lesser extent, the standing room-mile or the product of the standing capacity in excess of the seating capacity into the car-miles run.

In addition to this service information, the mechanical department desires to know the total number of miles operated by each car, not only from month to month but also between any important alterations, such as a replacement of a motor, turning down or replacement of wheels, repainting or other important repairs. It also desires to know the total mileage run by each type of car, by each type of car motor, and by individual groups of cars having any one of a number of common characteristics. It is also necessary to distinguish between various types of operation. For example, the company runs unit motor cars, trains of one motor car with one trailer, trains of two motor cars, trains of two motor cars and one trailer, and trains of three motor cars. It is desirable to have an individual record of the mileage made by each car, in addition to the mileage of each type of train in such operation.

The system of recording mileage is based on the use of automatic tabulating machines. The basic information furnished by the line superintendents at the various carhouses is arranged to make the tabulating easy.




**The Permanent Index Is on 5-In. x 8-In. Cards, Which Carry the Monthly Figures for 6 Years and on the Back a Record of Pull-Ins**

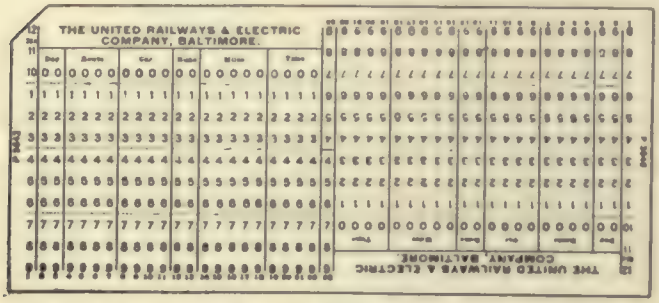
Each run is given a code number, the first two figures of which indicate the line and the last two the particular run on that line. Each morning a report of the previous day's operation is sent in on a form which contains the code number, the number of each car operated during the previous 24 hours, whether motor or trailer, and the number of trips of each type of operation made on that particular route. The line superintendent totals the number of trips and signs the report.

Each line superintendent is furnished by the traffic department with a number of schedules corresponding to variations in service from day to day during the week. When it is necessary to vary the runs from the schedule, in order to give extra trips or to curtail the service, due to temporary conditions, it is reported on a single sheet for each line. The report slips of all the runs on a given line and the reports showing variations from the standard schedule for that line are placed in a single envelope 4¼ x 11 in., as shown in an accompanying illustration. This envelope is indorsed with the date, the number of the line, the number of the schedule operated and with check marks opposite the last two numbers of the run codes which are to be found within the envelope. The envelope is then signed by the line superintendent and forwarded to the mileage bureau.

At the mileage bureau the slips for the individual runs are first verified as to their coding and as to the total number of trips made. This is then checked with the schedule requirements for the day, to determine whether the report of extra and short runs is accurate.

*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

The slips are then passed to a punch operator, who punches a run master card of the ordinary type used with automatic tabulating machines. The punch card contains columns for the month, day, trip, car number, route, trips, card count, miles, and minutes. A line master card, using the same form, is then punched and the listing by lines, with a grand total for the system, is added to the previous listing. The completed listing, together with the totals of the reports on extra and short runs, is then forwarded to the traffic department for its records.




One of the Punch Cards for Tabulating Individual Car Records

Meanwhile the original report slips have gone back to the punch operators, who punch a card for each car operated on each run. This card, shown in one of the illustrations, contains columns for month, day, route number, car number, number of runs, number of miles, and time. In order to determine the number of miles and minutes operated, a series of mileage tables has been prepared covering any trip likely to be run by a car within the 24-hour period. A typical table of this sort is illustrated herewith. In practice, however, it is not necessary to punch the minutes on anything but the run master card. These cards are then listed and verified and compared with the totals for the individual runs and lines already completed.

Every 10 days cards for individual cars are sorted and filed by car numbers, and at the end of each month the entire list of cards for that month is listed and totaled by individual car numbers. This gives the total car mileage for each car during the month.

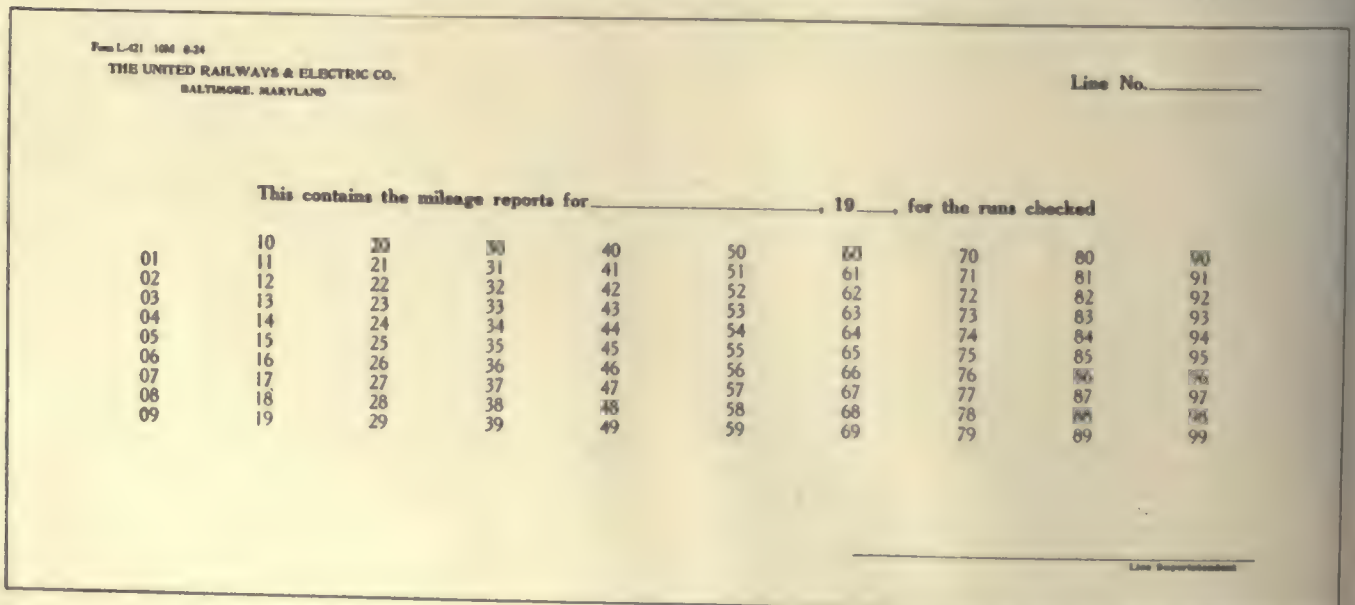
It will be noted that the car card is reversible and can be used a second time. The 23d column is divided. The half belonging to each end of the card is used to designate the type of operation. Before the cars are sorted by car numbers, they are first sorted for type of operation, so that the final record at the end of the month shows not only the mileage for each car, but also the type or types of service which the car rendered.

When the monthly listing is complete, the totals for each car are posted to the permanent index, consisting of a 5 x 8-in. card, illustrated herewith. The card is arranged to carry the monthly figures for a period of 6 years. For the sake of convenience, single-unit car operation is indicated by a white card, while the various other types of operation are shown on colored cards. It is obvious that by an inspection of this card, the total mileage of any individual car may be determined quickly from the beginning of the system down to the end of any particular month. It is not possible, however, to determine the mileage to any date other than the end of a month.

When car mileage is desired up to intermediate dates, it is invariably in connection with some shop operation. To prepare the record, the shop is required to report daily the car numbers of all cars entering the shop, and before the cars for that particular car are listed for that month, they are first listed and totaled up to the date on which they entered the shop. This record is entered on the back of the same card, together with the total mileage of the car from the beginning of the system up to the date when it entered the shop. Obviously, the mileage between any two shopping dates is the difference between the two figures opposite those

TYPICAL MILEAGE TABLE
EDMONDSON AVENUE LINE, FROM WINDSOR HILL MONUMENT AND 11TH STREET

| Runs | Miles | Minutes | Runs | Miles | Minutes |
|---|---|---|---|---|---|
| 1 | 17.62 | 122 | 11 | 193.82 | 1,342 |
| 2 | 35.24 | 244 | 12 | 211.44 | 1,464 |
| 3 | 52.86 | 366 | 13 | 229.06 | 1,586 |
| 4 | 70.48 | 488 | 14 | 246.68 | 1,708 |
| 5 | 88.10 | 610 | 15 | 264.30 | 1,830 |
| 6 | 105.72 | 732 | 16 | 281.92 | 1,952 |
| 7 | 123.34 | 854 | 17 | 299.54 | 2,074 |
| 8 | 140.96 | 976 | 18 | 317.16 | 2,196 |
| 9 | 158.58 | 1,098 | 19 | 334.78 | 2,318 |
| 10 | 176.20 | 1,220 | 20 | 352.40 | 2,440 |




Individual Mileage Reports for a Line Are Placed in This Envelope for Transmission to the Mileage Bureau

dates on the back of the card, and no necessity remains for preserving the original punched cards for that month.

At the end of the month a set of car master cards is punched, showing for each car its number, type of operation, car model, motor type, seating capacity, and standing room capacity. These master cards are sorted mechanically under each of the above classifications, listed and totaled. In this way, the total mileage made during the month in each class of service is determined for each class of car and each type of motor. The total number of miles run by a group of cars with a common seating capacity or a common standing room capacity is then multiplied by that capacity and the sum total of these products is the total seat-miles or the total standing room-miles furnished as a matter of public service.

### Special Car Mileage

A serious problem encountered was that of chartered cars or special or occasional trips that could not be coded as running over any particular route. The report made out by the line superintendent for such a car gives the car number and the description by streets of the route which it travels. The determination of the total distance in a complicated system, such as that of Baltimore, has involved in the past an amount of time altogether disproportionate to the value of the information.

In order to handle the problem, a special map of the system has been devised, in which the distance scale is entirely disregarded, the only effort being to indicate each line of track by a line on the map so as to be able to indicate by street names each piece of track and further to indicate all intersecting track by an intersection of lines on the map. All cross-overs, carhouses, or other terminal points are indicated by cross marks on the line representing a given stretch of track. The map is drawn in four colors, and the distances pertaining to each line are written thereon in the same color as the line. These colors are so distributed that no line of a given color at any point in its course meets another line of the same color. Each color stretch is treated as an individual piece of track, with a zero at one end of the line, and the distance is marked in the same color from this zero station to every carhouse or other terminal point, cross-over or connecting curve where cars could turn back or get off the route.

The movement of each special car is reported to the mileage bureau with a description of its route by streets. From this description it is easy to set down the distance from the zero station to the point at which the special car enters and leaves each individual color stretch, the greater of the two numbers being placed in the left-hand column and the lesser in the right-hand column. When the entire trip has been posted, the total in the left-hand column minus the total in the right-hand column gives the total mileage for the trip.

With this system it is possible to report to the traffic department before the close of each day's business the total number of trips, the mileage and the car-hours for the previous day on each run, on each line and on the entire system. The mail-car mileage, chartered car mileage, work-car mileage, and supply-car mileage are also computed. At the same time, there is given a list of all variations from the standard schedule, including the number of extra and short trips and the extra and short mileage.

# Inspection Schedule Reduces Accidents

## Specified Dates Each Month Used for Consideration of Certain Operating Points Reduced Number of Accidents in El Paso Remarkably in Two-Year Period

EARLY in 1923 the method of inspection of trainmen was changed radically by the El Paso Electric Railway, El Paso, Tex. The new plan was adopted as part of a campaign on the part of the company, under the leadership of Alba H. Warren, for the reduction of accidents. The campaign as a whole was described in considerable detail in ELECTRIC RAILWAY JOURNAL for Dec. 22, 1923, page 1047. Instead of having the inspectors make only general observations when watching the operators, they were requested to look for certain specified items on the various days of the month, according to the schedule shown in Table I. This schedule made

TABLE I—MONTHLY SCHEDULE USED BY TRANSPORTATION DEPARTMENT INSPECTORS IN EL PASO, TEX.

| Day of Month | Special Matter Under Investigation |
|---|---|
| 1 and 16 | Proper feeding. |
| 2 and 17 | Careful operation at railroad crossings and special trackwork. |
| 3 and 18 | Speed of cars, safety stops, junctions and slow signs. |
| 4 and 19 | Caution at "blind" corners. |
| 5 and 20 | Courtesy, personal neatness and cleanliness. |
| 6 and 21 | Car spacing. |
| 7 and 22 | Passing automobiles and care in traffic. |
| 8 and 23 | Gong ringing. |
| 9 and 24 | Reports, car defects, accidents. |
| 10 and 25 | Power consumption. |
| 11 and 26 | Warning signs to autoists and maintenance. |
| 12 and 27 | General inspection of overhead, slow signs, etc. |
| 13 and 28 | Railroad crossing signs or markers at danger points. |
| 14 and 29 | Signal lights, headway recorders and electric switches. |
| 15 and 30 | Condition of track and landings. |
| 31 | General review. |

it a requirement that particular attention be paid twice each month to each of the points listed, although of course the inspectors continually instruct the men in regard to all the requirements of the company.

The result of the new method of inspection was that all the men were kept constantly on their toes to observe and to report anything that could improve the service or reduce accidents. By maintaining this system of bringing out the points which an operator should be observing at all times, the men were prevented from losing interest in their work.

The result has been a material improvement in the operation. That it has been a big factor in reducing accidents is shown by Table II, accidents having been

TABLE II—ACCIDENT RECORD BY MONTHS, 1921-1924, EL PASO ELECTRIC RAILWAY

| | 1921 | 1922 | 1923 | 1924 |
|---|---|---|---|---|
| January | 152 | 164 | 101 | 73 |
| February | 133 | 144 | 98 | 62 |
| March | 163 | 162 | 98 | 47 |
| April | 177 | 119 | 98 | 41 |
| May | 173 | 150 | 116 | 39 |
| June | 147 | 105 | 89 | 47 |
| July | 147 | 109 | 49 | 55 |
| August | 122 | 84 | 63 | 49 |
| September | 128 | 89 | 56 | 48 |
| October | 120 | 74 | 87 | 34 |
| November | 141 | 98 | 69 | .. |
| December | 164 | 103 | 98 | .. |
| | 1767 | 1401 | 1022 | *495 |

*Ten months.

reduced from 1,462 in the first ten months of 1921 to 495 for the corresponding 10 months of this year. The record is improving steadily, the best record being that for October of this year, with 34 accidents, as compared with 87 last year and 74 two years ago.

# The Readers' Forum

## *Comments on Report of Committee on Foreign Operation*

MOUNT VERNON, N. Y., Dec. 1, 1924.

To the Editors:

It may seem rather late in the day for a discussion of some high lights in the report of the A.E.R.A. committee on foreign operation, but surely such discussion is warranted by the importance of the subject. The fact that this splendid report was the last feature of the last day of the 1924 convention was unfortunate. However, the publication of the report in itself has already proved of great value, notably with regard to the true status of the motor bus. Such a report was needed, for even its wide publication has not prevented repetition in the Detroit *Times* during November, 1924, of the well-worn fable that the bus has replaced the tramway in London!

The committee rightly stresses the difficulty of international exchange of good practices in full. Yet where there's a will, there's a way. We may reject the use of ticket inspectors to check over-riding, but we are accepting the differential fare principle of Europe just the same. San Diego is an early successful example; Public Service Railway, a later convert. On the other hand, although the manager of the Amsterdam Municipal Tramways was delighted with our safeties, he had no air compressors to permit electro-pneumatic control, but he did find a way to apply the same principles with electro-mechanical equipment.

The committee has done full justice to the fact that while the foreign tramcar is less comfortable and perhaps 10 per cent slower, it is cleaner, quieter, lighter and better maintained than our cars. Part of that quietness is due to a high standard of track upkeep. During a British visit directly after the war, almost every manager apologized for his track. Although I rode often on the upper decks of the cars, I certainly did not observe shocks, nosing or other defects severe enough to have elicited like apologies here.

### FRANK TALK ON THE BUS

Those who read my studies on "The Place of the Bus" published during 1920 in the ELECTRIC RAILWAY JOURNAL will recall that the arguments for the coordinated use of bus and car were drawn almost entirely from British practice. American street railways then held bus operation in horror. But while the Britisher started first we have been moving so fast during the last two years that now he can learn from us in equipment, if not in applications. That is because we are both a richer and more hysterical people. The very railways that fought the bus most flopped the hardest once they were convinced.

The committee has used no gloves in handling the problem of buses for big-scale transport. Some extreme bus advocates may even feel a brass knuckle or two. Its outstanding statement is that "whatever street congestion there is . . . is caused almost entirely by motor buses and taxicabs."

It is a fine thing for the prospective rider to board a vehicle at the curb, but it does not speed up general vehicular movement if great, hulking double-deck buses are constantly cutting across the lines of faster automobile and truck traffic between the street center and the curb. If other traffic has no rights, why not build the car tracks alongside the curb?

The committee was told by Lord Ashfield, managing director of the Traffic Combine, that the present billion a year tram riders could be carried by buses "in the event that sufficient street space . . . were provided." He did not suggest that the motor bus should pay for said widening. On the other hand, the London County Council Tramways account in respect to "Cost of street improvements" shows that up to March 31, 1922, £809,295, or about $3,883,200, had been assessed against the street railway for such widening, exclusive of paving. Had the motor bus been saddled in this manner, there would have been little or no profit. Therefore, one of the big advantages of bus over tram in London is that it has enjoyed a subsidy out of the public funds via the street car rider.

The committee was impressed with the apparent recklessness of British riders in boarding or leaving cars and buses. Its comment that this nevertheless has not been reflected in damage claims is borne out by reports of these tramways for fiscal years ending in 1924: Bradford "accident insurance and compensations" account, 0.7 per cent of traffic revenue; same account Manchester, 0.6 per cent; Glasgow "third party accident" and "employers' liability" combined, 1.9 per cent. Glasgow's higher figure is due partly to its heavier traffic and possibly, also, to a provision that calls for trial of accident suits at Edinburgh.

With regard to the trackless trolley or "railless," the British have several special reasons for favoring it. First, the cost of energy is no higher if not lower than ours, but gasoline sells for 25 cents per American gallon against our range of 11 to 20 cents, with 15 cents preponderant; second, British cities operating tramways usually own the central station and don't want to lose trade; third, where the replacement of a trackway is concerned, it is much easier from a franchise viewpoint to replace with trackless trolley than seek motor-bus rights from Parliament. For all that, motor buses far outnumber trackless trolleys, as here.

In discussing Bradford, the committee notes that nearby towns were unwilling to have Bradford routes extended their way, and it thinks that "this was a rather interesting sidelight on municipal ownership." This feeling has nothing to do with municipal ownership, but is simply the fear of the little communities that such extension of the big communities' utilities is the first step in their political annihilation. This handicap has been foreseen in Detroit by a provision in the state charter which permits the Department of Street Railways to operate for 10 miles beyond its boundaries.

### LESS CONGESTION OF POPULATION IN LONDON

The committee is not quite correct in stating that London is uniformly built up to four or five stories. The greater part of London's housing consists of small houses for one, two or three families, but many downtown areas and sections alongside of the main highways seen by the chance visitor are of the apartment type. The facts are revealed by the statistics on population per acre. In 1920, inner London had 60 inhabitants and inner New York (Manhattan Borough) 123 inhabitants per acre. Greater London had only 17 per acre, while all New York had 28 per acre. The center of flat-fare New York is 125 per cent more densely settled than the center of zone-fare London, while New York as a whole is 65 per cent more densely settled than London.

The committee's adventures on the most heavily traveled city routes in the world led it to include that one-man operation is "virtually impossible" with zone fares. These are strong words when we consider that there are already in use a number of distance-fare routes in America and Europe with one-man cars or buses. It is true that many are light cross-country lines, but San Diego with two zones in the city and more on the suburban extensions has already advanced from one-man single-truck to one-man double-truck cars.

Again, of the 35 managers who answered a questionnaire of the International Street & Interurban Railway Association, 14 did consider operation of one-man cars practicable under zone fares and 12 more agreed it was all right for light lines anyway.

There are many two, three and more zone properties abroad where one-man operation will be feasible if the managements can find the money for automatic appliances, wider platforms, vestibules, fare boxes, ticket-issuing machines and other Americanisms, although it may never be possible to carry such operation to the same degree as under a single fare.

The mystery of "Why do the British keep double-decking?" brought no more satisfactory reply than that they have always done so. America used to double-deck in a small way in horse-car times, but today there are less than ten double-deckers in all. Continental Europe has practically discarded double-deck cars, yet Berlin and Vienna have double-deck buses. Paris, which had double-deck buses in horse days, has since standardized on single-deckers, although the bus is not yet capable of using a trailer to secure increase of unit capacity.

### Double-Deck Cars Losing Caste

But at recent British conventions there have been rumblings against continuing the double-deck car, which necessarily must run at a lower schedule speed than single-deckers owing to greater standing time and high center of gravity. London no longer attaches single-deck trailers to double-deck motor cars because the County Council Tramways are out for greater speed through use of interpole motors and other improvements. Before the war, speed did not bother operators because there were almost no standing loads. Post-war conditions brought the 8-hour day, which piles up the peaks very sharply. No later than September, 1924, General Manager Wilkinson testified, in arguing against a cut in workmen's fares at Bradford, that 37 per cent of the total load was carried between 8 a.m. and 9 a.m. Formerly, the laborer was on the cars at 6 or 7 a.m. Now one of the most common fare petitions is for the privilege of having the workmen's half fares apply as late as 8 a.m. or 8:30 a.m. The committee's reference to the new Edinburgh cars is proof that this approach to American loading is bringing American ideas of passenger interchange, viz., separate doors for entrance and exit.

The committee may not have had the doubtful pleasure of riding the Paris solid-tire single-deck buses over the cobbled by-ways of that wonderful city. The Paris company may think pneumatics still an experiment, but the Michelin Tire Company is of another opinion. In a recent advertisement, headed, "Parisians—A Scandal," Michelin presents this deadly parallel: On the left, pigs ride softly to slaughter on pneumatic-tired trucks; on the right, the worthy fare-paying Parisians are being jounced on hard-tired buses.

With increased familiarity, the public is as critical of bus equipment as of the longer known trolley. It wants no slat seats in cars or hard tires under buses. The 15,000,000 soft-cushioned automobiles of America have set a high standard for vehicle comfort, no matter what the rate of fare.

As to gas-electric buses, it was my privilege to study in great detail the costs and operations of the Birmingham & Midland Motor Omnibus Company, which operates some 250 of these buses as standard. Comparison with the straight gasoline buses of other companies in the same syndicate did not disclose any marked economy in fuel and upkeep, but it was obvious that the gas-electric bus was easier to ride and far less noisy.

Supplementing the committee's notes on "Noise of Operation," be it noted that the Amsterdam and Malmö tramways have done something on their one-man cars worth copying the world over on any kind of car or bus. They have substituted passenger stop-lights for the noisy bell or irritating buzzer. How much more pleasant a ride would be if signal and register noises could be eliminated forever.

### Proportions of Short-Haul Riders

Under the heading "Kinds and Rates of Fare" the committee notes that in Britain the one-zone riders tend to make up 35 to 50 per cent of the total traffic. It is not entirely correct to assume that "this reflects the closely built-up nature of most of the European cities" because like percentages occur in widespread cities like San Diego; Melbourne and Adelaide in Australia and Christchurch, New Zealand.

In San Diego, with only 2.5 inhabitants per acre of all its area and but 13 per acre on built-up ground, the number of one-zone and two-zone riders is almost exactly the same. In this case, the inner zone rider averages 1.3 miles per ride and the outer zone rider about 3 miles.

At Melbourne the cable system operating in the older section carried only 31 per cent at the minimum fare of 1.5d., whereas the electric system operating in the suburban areas carried 47 per cent at the minimum fare during the year ended June 30, 1923. Although Adelaide fares go to 12d., the average of 2.5d. indicates a very high ratio of short-haul riders. The Christchurch report for the year ended March 31, 1923, shows that more than 60 per cent of the traffic was at the minimum adult fare of 2d. or 4 cents.

These figures show that the proportions of rides at different rates of fare are affected just as much by the scale adopted as by the distribution of population. Through juggling the rates you can get anything you want.

Since the committee's table showing average bus and tram rides for given fares had to omit the London bus, it is worth adding that London bus fares vary by 30 per cent just according to the presence or absence of tramway competition, and that they include no workmen's rates. As the buses have a much higher seat-use factor than the trams, they naturally do not favor any off-peak reductions such as the "tuppeny all-the-way" concession of the London County Council Tramways. The gains from this concession, as mentioned in the report, refer of course only to the tramway business of the mid-day hours. In the fiscal year ended March 31, 1924, 28 per cent of the passengers rode at mid-day rates and 13.75 per cent at workmen's rates.

The British zone fare is found in many varieties. Glasgow and Leeds tend to work toward the same average length of ride for each increment in fare. Manchester seeks to give the longest possible ride for the

minimum fare figuring from the downtown center. The London Underground fares, like American steam railroad commutation, give more and more per penny the farther one rides. No one dreams of rigidly interpreting the legal limits of 1.5d. or 2d. per mile. These may be the average rates per mile, but the stages themselves are never laid out in geographical miles. They are laid out chiefly according to traffic intersections and may vary greatly not only on the system as a whole, but on individual portions of the same route.

In connection with fares, the report remarks briefly that the actual wages in Europe generally are but one-third to one-half of ours. The state of the continental coinages makes a comparison impossible for all European countries except Britain. As regards Britain, it would be more correct to say one-half to two-thirds. The comparison cannot be made on the basis of hourly rates or even weekly earnings because the men receive uniforms and overcoats free, vacations with pay for a week or more, longer time allowances, higher overtime rates, etc. It is true that British platform men do not live so well as ours, but this is also due in part to the fact that luxuries cost more, whether movies or flivvers. The platform man's standard week is 6 days, totaling 48 hours.

The committee correctly assumes that there is loss from over-riding under the zone fare prevalent abroad. There is also a loss due to the fact that a passenger on a loaded double-decker may have already ridden a stage before the conductor gets around to him. However, these losses are not inherent to the zone-fare system. If the passenger had to give up his receipt upon departure instead of throwing it away where he pleased, there would be no more over-riding than on our own distance-fare routes. The use of closed prepayment areas or of street collectors at heavy boarding points would also minimize the second kind of loss mentioned. One of the crying needs of the busy British tramway has been a car that will permit entrance on one platform and exit on the other. The double-deck design is largely to blame because the stairways leave so little room on the platforms.

### The Weekly Pass at Hull and Bradford

Last, but not least to me, is the final paragraph in the report giving some of the experiences with the weekly pass at Bradford, also used at Doncaster and Hull. There is some humor in the fact that the weekly pass, derived from the foreign season ticket, should return to its home clothed with transferability and a 7-day period instead of 3 months or so. When A. H. Wilkinson, general manager, requested counsel in the matter, I suggested the pass as a means of speeding up fare collection and of putting off the then threatened reduction of the base fare from 1.5d. to 1d. If it did not make money, you will observe that the report states it has been saving money at the rate of £95,000 a year. It was not expected that the pass would have much sale among workmen because the latter get a lower rate anyway and have less money for off-peak diversion, but the sales actually have been much higher than I expected because some of the better-paid riders have given up their workmen's rates in favor of the pass.

WALTER JACKSON.

# Association News & Discussions

## Features of Second Convention of Central European Street Railways

**At the September Meeting of the International Street and Interurban Railway Association Many Features of Equipment and Track Design, Maintenance Methods, Fares and Employment Problems Are Discussed**

THE second convention of the Internationaler Strassenbahn und Kleinbahn Verein (International Street and Interurban Railway Association) opened at Homburg von der Höhe on Sept. 3-5, 1924. This organization of central and northern European electric railways was founded in 1920 at Nürnberg and its first big meeting was held in Vienna in 1921. In opening the 1924 sessions, President Ludwig Spängler, general manager Vienna Municipal Tramways, noted that the 1923 meeting scheduled for Budapest had been postponed because of the continuance of unsettled economic conditions. He was sure that the participation of 330 delegates and 100 women visitors presaged better times. The association has now more than 400 members.

A paper on one-man cars was presented by Messrs. van Putten and Hultman, respectively general managers of the Amsterdam and Malmö systems. This was abstracted in this paper for Nov. 28, page 926. In Europe, the dominant desire for such cars was saving in labor cost by bringing wages to say 36 per cent of the revenue or 41 per cent of the operating expenses. Twenty-five systems were operating one-man cars and 14 more contemplated doing so.

General Manager Geiser of the Schaffhausen Tramways discussed the growing competition due to cross-country automotive lines. In 1907, Switzerland had only 3,837 motor vehicles; now there were 40,116. Regulation of this rapidly growing means of transport was certainly in order. The Swiss railways have therefore demanded of the government that (1) railway regulation should be moderated; (2) special rebates for mail carriage should be eliminated; (3) tariff on rails and special work should be removed; (4) taxes should be imposed on automotive transport to pay for their use of the highways; (5) general service and tariff regulations covering automotive transport, including restricting the over-all weight of vehicle to 5 metric tons (11,020 lb.) should be enacted. The speaker recommended that the railways take up and co-ordinate motor transport with rail transport.

General Manager Norregaard, Copenhagen, followed with his paper on the efficiency of transportation personnel as judged by mileage output, placing stress on the need for separating city and cross-country roads in making comparisons of relative net speeds, etc. This was abstracted in the issue of this paper for Nov. 1, page 775.

Alexander Patz, acting general manager Budapest Tramways, then discussed methods for securing better spacing of cars; and also means for judging the relative efficiency of the different depots from both transportation and maintenance viewpoints. (See ELECTRIC RAILWAY JOURNAL for Nov. 15, page 856.)

### Anti-Friction Bearings—Track

Two papers were to have been presented on anti-friction bearings. Dr. Vidéky, Budapest, based his paper

largely upon a discussion of design, classification and material. However, General Manager Pforte of the Hagen Tramways refrained from presenting replies to the questionnaire for discussion because the answers had been given for the postponed congress of 1923 and they therefore no longer gave a fair picture of progress. (Abstracted in the issue of this paper for Nov. 1, page 774.) General Manager Hubrich, Essen Tramways, who spoke for Mr. Pforte, stressed the importance of more exact tests, such as having different cars run to their coasting limit with and without anti-friction bearings—aside from the use of watt-hour meters. It was resolved to continue the questionnaire as a feature for the next convention.

Chief Way Engineer Goetz, Leipzig, followed with his paper on track and its upkeep. (Abstracted in the issue for Nov. 15, page 854.) At his suggestion the meeting adopted resolutions calling for fewer curves with longer radii, for preferential specification of standard rail sections and for the elimination of concrete sub-structure in favor of well-drained broken stone foundations accompanied by welding of all joints.

General Manager Hausmann, Coblenz, presented an interim paper on standardization of grooved rails in three classes, viz.:

DIMENSIONS OF PROPOSED STANDARD RAILS FOR CENTRAL EUROPEAN TRAMWAYS

| Section Number | 1 | 2 | 3 |
|---|---|---|---|
| Height, mm. | 180 | 180 | 160 |
| Base, mm | 180 | 160 | 160 |
| Tread, mm | 56 | 50 | 48 |
| Width of groove, mm.: | | | |
| Tangent track | 31 | 31 | 31 |
| In curves | 34 | 34 | 34 |

The standardization study is to be continued by the Technical Commission of the Verbandes schweizerischer Secundärbahnen (Swiss Secondary Railways Association), of which Dr. Zehnder, general manager Montreux-Oberland Railway, is chairman.

### Magnetic Brakes—Power-Checking Plans—Self-Ventilated Motors

The second business session, held on Sept. 5, opened with the paper on magnetic brakes by General Manager Barth, Christiania (issue of Nov. 15, page 855). He was followed by General Manager Pforr of Berlin, who discussed current saving without the use of checking devices (issue of Nov. 1, page 776).

The paper on self-ventilated motors by Mr. Nier, engineer of the Dresden system (abstracted in the issue of Nov. 15, page 854) was discussed by Dr. Zehnder of Montreux, Switzerland. Ventilated motors had made good on his line, which is 76 km. (47.1 miles) long, meter gage (39.37 in.) and in difficult country. On other narrow-gage lines there were difficulties in drawing air directly from the trackway, so that car-body or roof intakes were preferable in such cases. The temperature difference of ventilated and closed motors increased with the increase in stop spacing. With stops only 180 m. (590 ft.) apart, there was no difference, while for long runs the difference might be in the ratio 2: 3.

Mr. Paap, retired government engineering councilor, Berlin, then gave a talk on couplings.

August Winter, executive staff Vienna Municipal Tramways, in presenting his paper on fares in municipal areas (issue of Nov. 29, page 924), observed that the proportion of weekly wages which a workman paid for a single fare, averaged as follows:

| | |
|---|---|
| Scandinavia | 0.0020 to 0.0025 |
| Holland | 0.0024 to 0.0029 |
| Switzerland | 0.0015 to 0.0023 |
| Austro-Hungarian succession states | 0.0030 to 0.0038 |

The total annual expenditure for carfare may reach a sum equivalent to four weeks' wages.

The meeting closed with a demonstration lecture on wireless telephony and radio by Prof. Leithäuser, Berlin, and the possibilities it offered in railway service for communication with moving vehicles, using rails, wire and vehicles as part of the transmission system.

### Next Meeting at Budapest

The association decided to hold its next convention at Budapest in June, 1925.

At a suggestion made by General Manager Ruijs, Enschede, it was planned to ask the Union Internationale de Tramways, de Chemins de fer d'Intérêt local et de Transports Publics Automobiles to use its good offices to intercede for German street railway managers who had been exiled in the course of the military occupation.

## Tramway Men Attend Colorado Utilities Convention

ABOUT 100 delegates, including many electric railway men, from Colorado, Wyoming and New Mexico, attended the second annual mid-winter conference of the Colorado Public Service Association and the Rocky Mountain Division of the National Electric Light Association held in Denver on Dec. 18.

E. A. West, general superintendent and chief engineer Denver Tramway, who was one of the principal speakers, pointed out that in regulating the traffic on the streets of the cities, insufficient attention is given to the tramway, whereas it should be one of the principal things to consider when planning new regulations.

## A.E.S.C. to Hold Conference on Line Materials

A CONFERENCE has been called by the American Engineering Standards Committee as the result of proposals for the standardization of overhead line materials made by the American Electric Railway Association. This will be held at the Engineering Societies Building, New York City, on Jan. 13, 1925, beginning at 10 a.m. The purpose of the conference is to determine whether the unification and extension of specifications for overhead line material, such as pole line hardware, cross-arms and pins and strain insulators shall be undertaken.

At the conference the present situation in regard to specifications for overhead line material and the suggestion of general policies as a basis of discussion will be presented by M. B. Rosevear. The question will be taken up as to whether there are any overhead line materials for which specifications should be unified, and if so, whether it is desirable that the unification shall for the present be limited to materials used by two or more branches of industry or whether specialized materials for specialized industries should be included. The inclusion of materials and dimensional data, and nomenclature will also be discussed.

Work on the following subjects is already in the hands of representative sectional committees under A.E.S.C. procedure: Wood poles; tubular steel poles; conductors; insulated wires and cables; annealed, medium and hard-drawn copper wire; zinc coating of iron and steel.

## Kentucky Utility Meeting

THE annual meeting of the Kentucky Association of Public Utilities will be held at Louisville, Jan. 15 and 16, 1925. About 300 public utility executives from Kentucky and surrounding states are expected at the meeting.

Convention rates of one and one-half times regular one-way fare have been arranged for by the Southeastern Passenger Association and the Central Passenger Association. These rates apply on all tickets costing 67 cents or more one way. The selling dates are Jan. 12 to 16 inclusive, and the last honoring date, Jan. 20.

# American Association News

## Subjects and Meetings

THE committee on subjects and meetings met in New York Dec. 19 for the purpose of more definitely drawing up the program for the Midyear Meeting of the association to be held in Washington on Feb. 17. As tentatively outlined, in addition to certain outstanding speakers, the program during a portion of both the morning and afternoon sessions is to take the character of an old fashioned "town meeting." In the morning the discussion will be somewhat in the nature of checking up of the electric railway business with comments from the point of view of the manufacturer, car rider and railway. In the afternoon the subject of when, where and how to use buses will be discussed from the point of view of manufacturers and railways. The committee also determined upon the speakers to be invited for the two business sessions and the banquet in the evening.

Members of the committee present were Chairman W. H. Sawyer, H. D. Briggs, Harry L. Brown, Charles H. Clark, F. W. Doolittle, C. R. Ellicott, C. W. Kellogg, E. F. Wickwire and J. H. Hanna.

# Maintenance of Equipment

## Efficient Method of Cleaning Armatures

THE usual method of removing loose dirt and dust from armatures when they are removed for overhauling is to direct a spray of compressed air on the equipment. To blow off the dirt efficiently, and at the same time to prevent dust from flying off during the process, inconveniencing adjacent workmen, the equipment shown in the accompanying illustration is used in the 39th Street shops of the New York Rapid Transit Corporation, Brooklyn, N. Y. It consists of a sheet-steel drum whose upper section is hinged so as to permit the insertion of the armature. The armature is supported on two sets of rollers, so that it can be rotated easily. The end brackets are arranged so that the weight of the armature is carried directly by the 1½-in. pipe framework on which the drum is mounted.

With an armature in position the top is closed down and compressed air is turned on through two pipes passing into the bottom of the drum. At the back of the lower section is a 4-in. exhaust pipe. An exhaust blower in this line draws off the dust as it is blown from the armature and the dirt is carried to a receptacle on the outside of the shop. The armature can be rotated by a workman inserting his hand through a hand hole in the end of the upper section of the drum. By the use of this equipment armatures are cleaned efficiently and all dirt is confined so that it does not fly off in the shop and interfere with other work.



This Cleaning Drum for Armatures Has a Suction Attachment for Removing the Dirt

## Fiber Covered Rods for Brush Holders

AS THE result of trouble which had been experienced with metallic bracket arms on brush holders, the Eastern Massachusetts Street Railway is replacing these parts with fiber-covered metal rods. The appearance of the modified brush holder is substantially the same as before, as is shown in the accompanying illustration. It has been the experience of the railway since undertaking this change that there have been fewer short circuits. Ordinary fiber tubing is used to cover the metal rod.

## Counteracting Corrosive Effect of Acids

DIFFICULTY has been experienced by the Boston Elevated Railway on account of damage to the exterior paint of its new rapid transit cars operated through the



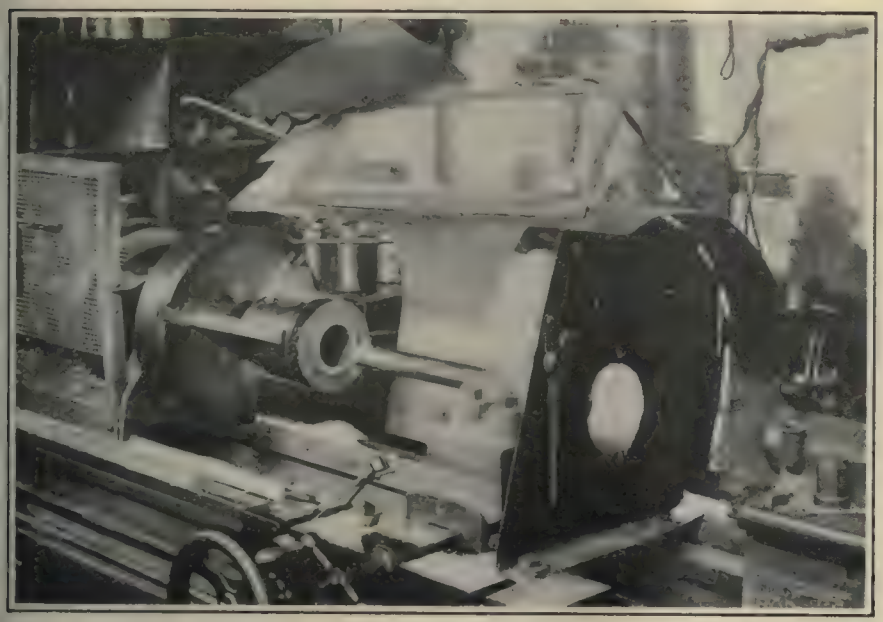
Defacement of East Boston Tunnel Cars Caused by Salt Water Dropping on Roof and Running Down the Side

East Boston Tunnel. This tunnel was built many years ago and has always been somewhat leaky. Salt water seeps through and drops down on the roofs of the cars. From there it runs down the sides, checking the varnish, eating the paint, and corroding the metal. The nature of the defacement caused in this way is shown in an accompanying illustration. The company is using Wilson's Imperial Paint Restorer to counteract the corrosive effect of the salt water.

## Self-Centering Chuck Facilitates Bearing Machining

By W. L. BRIAR
Foreman Kansas City Railways

IN THE shops of the Kansas City Railways bearings are bored in a self-centering chuck having special long jaws that grip the bearing securely and hold it firmly in place during the operation. This chuck is manufactured by the Union Manufacturing Company and is known as No. 153 Class D.



A Special Long Jaw Type of Self-Centering Chuck Facilitates the Work of Machining and Boring Bearings. Complete Protection to Workmen Is Afforded by the Almost Totally Inclosed Housing that Is Set Up Around the Work

Although the bearing turning and boring operations are usually carried out in a large Gisholt lathe, the work may also be done efficiently in an ordinary engine lathe with the set-up shown in the accompanying illustration. In this case the boring bar is held in a special clamp on the tool post, and is readily fed into the work. For boring babbitted bearings to final size for fitting to worn shafts, this set-up is particularly useful since it avoids tying up the Gisholt lathe for this work.

Another interesting feature of the bearing finishing work as it is carried out in the Kansas City shop is the complete guard that is built around the work, for the purpose of conserving scrap brass and babbit and also to protect the operator and adjacent workman from flying bits of brass. It will be noted that a hinged brass shield on the front of the guard is arranged so that it can be lowered into a position that completely protects the workman's eyes, and at the same time allows him clearly to see the work in progress. An additional flexible flap on the bottom of the shield helps to confine the scrap brass to the pan provided for its collection.

## High-Speed Saw Makes Saving

A SHORT time ago the Altoona & Logan Valley Electric Railway, Altoona, Pa., replaced its old power-driven hacksaw by a Peerless high-speed saw. This change in the shop equipment has effected important savings in two ways. A great deal of time has been saved, and the labor cost thereby much reduced. It now takes only 15 minutes to cut a 5-in. axle instead of 2½ hours, which was required formerly. Moreover, the number of blades required has been much diminished. Whereas it used to require four or five blades to cut an axle, now one blade will do several jobs of this kind.

In addition to the ordinary work of the mechanical department, rails are cut for the track department. The greater speed of operation of the new saw has saved money for the company by eliminating much of the waiting time of track men while this work is being done.



This Saw Does a Job in 15 Minutes that Formerly Required 2½ Hours

# New Equipment Available

## Electric Hoist

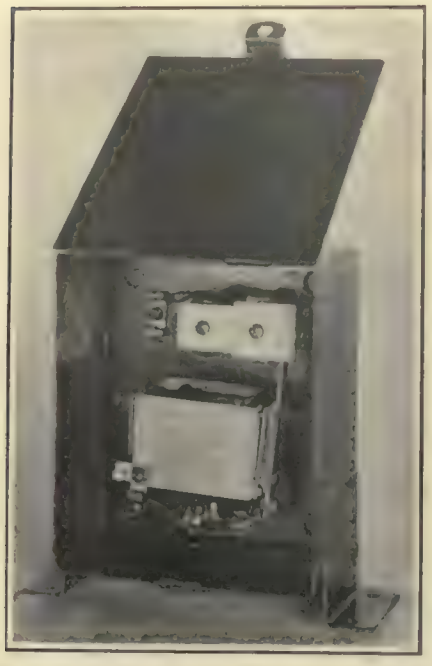
A NEW electric hoist designated as type R and available in capacities from 500 lb. to 4,000 lb. has been recently added to the line of the Roeper Crane & Hoist Works, Inc., Reading, Pa. The hoist is worm geared, the worm being placed above the gear to reduce wear. The worm shaft is equipped with end-thrust ball bearings. The motor is mounted directly upon an extension of the hoist frame. This is a one-piece casting that contains all bearings so that shaft and moving parts are kept in alignment. An automatic stop provides top and bottom limits. Controllers are of the single-speed drum type, although push-button control can also be furnished. The moving parts of the hoist are entirely inclosed and operate in a bath of heavy grease or oil.

## Improvements in Signal Light System

THE signal light system, as ordinarily used by electric railways, provides a visible indication for the motorman or operator to show when all doors are closed. Additional features incorporated provide that the doors cannot be opened until the car is stopped and that the car cannot be started until the doors are fully closed. A number of improvements in the various detail parts which constitute the signal light system have been made recently by the Consolidated Car Heating Company, Albany, N. Y.

The latest door switch, Type 397, which breaks and completes the signal light circuit as the doors open and close, has contacts thrown in or out by a toggle mechanism. The brass rollers now used for the movable contacts provide a wiping action as the contact is made, which eliminates trouble due to dirt or dust. A bakelite insulated base supports the movable contacts. The rear of this base is provided with two recesses for the springs which hold the switch in one or the other of its two positions. The contact studs are also imbedded in a bakelite base.

Where the control is interlocked with the doors in addition to provid-



The Type 700 Control Relay Has Magnet Coil in Series with Signal Light Equipment

ing a door closing signal, the Type 398 door switch is used. This has double sets of contacts, one set for the signal light circuit and the other for the interlocking control circuit. This type of switch is also used for making contact where variable load brake equipment is used. The box which houses the mechanism is of cast iron, about 4 in. square, and has a sheet metal cover. Contact is made by means of a copper disk with molded insulation on either side. The plunger which operates the contact disk has two springs, one for holding it out and the second for providing pressure on the disk. The new form of contact base is of bakelite canvas, with brass contacts. This type of switch can be arranged for operation either by the door itself or by the arm of the door engine.

The new motorman's starting signal light is smaller and neater than the previous design. It has a conduit mounting and a porcelain base for the lamps and contacts. As in the older type, two signal lamps are connected in parallel, but a resistance is in series with one of them, which prevents the lamp with which it is in circuit from lighting normally. When the right hand lamp fails the one at the left lights automatically without the mechanical action of any moving parts. When the burned out lamp is replaced it again gives the signal light as before. The resistor is mounted surrounding the porcelain base of the spare lamp, making the unit very neat and compact. Bayonet type lamps are used, as it has been found that these do not work loose through vibration.

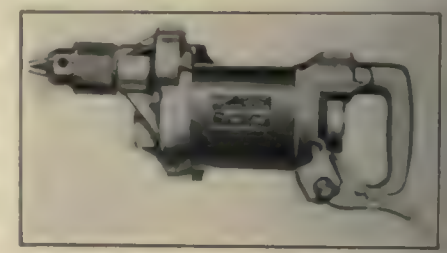
Some improvements have also been made in the Type 700 control relay, the magnet coil of which is connected in series with the signal light equipment. Compression springs are now used to open the circuit when the coil is de-energized. When all doors are closed, the magnet coil is energized and the relay contacts are closed. These contacts being in series with the magnet coil of the main line switch or contactors in the control circuit the car cannot be started until all doors are closed.

## Elevating Platform Truck

AN ELEVATING platform truck which has a height of 17½ in. from the floor when the platform is down and 22 in. when the platform is raised has been placed on the market by the Crescent Truck Company, Lebanon, Pa. The rear wheels have a diameter of 15 in., which gives 6 in. clearance underneath the platform. All the tires are 5 in. wide and the truck has been designed throughout for heavy service, with a lifting capacity of 6,000 lb. The wheels are equipped with Timken roller bearings, the driving unit is carried on SKF ball bearings, the controller is built by the Cutler-Hammer Manufacturing Company and the motors are of General Electric manufacture. All working parts are accessible and readily adjustable. The loading platform is 70 in. long and 26 in. wide.

## Low Speed Electric Hand Drill

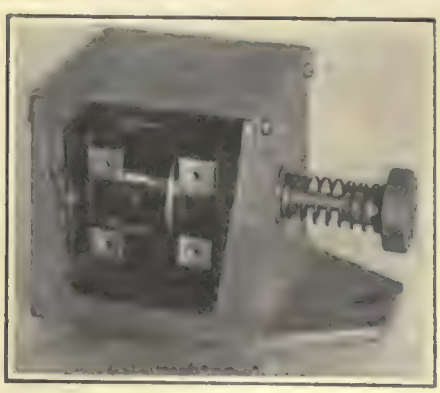
THERE are some materials, including slate and marble, which can only be drilled at a very low speed. To provide for this class of work the Hisey-Wolf Machine Company, Cincinnati, Ohio, has recently brought out a low speed electric drill. This operates at a no-load speed of 110 r.p.m. and has sufficient



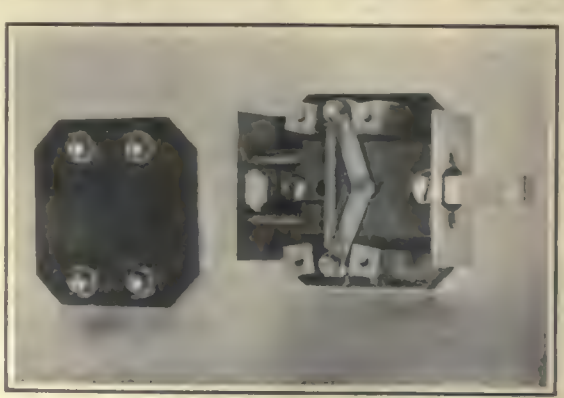
An Electric Drill that Runs at 110 R.P.M.

power for drilling holes up to ½ in. diameter. This drill is equipped with a universal motor which can be operated on either alternating or direct current. Ball bearings are provided throughout. A new feature is a quick cable connector, which permits cable repairs and renewals without dismantling the machine.

For drilling slate and marble the manufacturers recommend ordinary carbon steel twist drill ground with a straight chisel face. A drill ground straight across with the cutting edge at right angles with the sides will bore true to size. By grinding the cutting edge on a slant the drilling size of any bit can be increased, depending on the slant or angle at which it is ground.



At left, Type 398 switch interlocks control with doors in addition to signal lights.



Improved Apparatus for Car Signal Circuits

In center, switch used for door control of signal lights.



At right, signal light to indicate to motorman when all doors are closed.

# The News of the Industry

## Mayor Hylan a Witness

### Presiding Justice Has to Remind Auditors that Hearing Is Not a Show —Delaney Questioned

Mayor Hylan was the star witness of the week at the transit inquiry being conducted in New York as a result of charges filed with the Governor by the Mayor himself. A statement had been prepared by the Mayor in advance, but he was refused permission to read it. The statement, published in full by some of the newspapers, ran to the extent of a full newspaper page. Justice McAvoy said it could not go into the record unless presented under oath, but he would give the Mayor's brief consideration when he came to write his report.

Counsel for Justice McAvoy, who is to the subject of the questions. Most of the time the spectators were tittering. There were frequent raps of the gavel to restore order. At one point Justice McAvoy said:

This is not a show, gentlemen. It is an endeavor to find out what the trouble is with the various situations confronting the transit authorities.

Here are some samples of the Hylan sallies:

You don't have to be a transit engineer to have just ordinary common sense.

I wouldn't take up anything with McAneny (chairman of the New York Transit Commission). Not on your life. I don't trust him.

I have ridden on the subways and the elevated lines, and for many years I was a locomotive engineer and know something about service.

I am not going to let you lead me into a trap.

I am not an investigator. I am just endowed with ordinary common sense that God Almighty gave me. We are entitled to better service on the existing lines and until the end of my office I am going to fight for better service.

I am made the defendant instead of the prosecuting witness.

Mr. Sherman finally brought from the Mayor that the city's position regarding improvements in service had been presented to the commission "in a general way."

Mr. Sherman persisted in asking whether the Mayor had consulted any engineer in regard to how service might be improved and the Mayor finally said he had consulted Frank J. Sinnott, secretary of the Board of Transportation and brother of the Mayor's secretary and son-in-law, John F. Sinnott. The Mayor presented a memorandum, prepared by Mr. Sinnott, as to how service on existing lines might be increased.

Examination of the Mayor showed that this memorandum had been prepared very recently. The Mayor declared that he had done everything he could think of to compel "McAneny and the State Transit Commission" to give better service on the existing lines.

Certainly the hearing was productive of little that was constructive. The Mayor's brief, however, made plain the fact that he stands for these things:

Construction of new independent subway system to be operated at a 5-cent fare.

Establishment of an adequate motor bus service.

Proper service on existing subway, elevated and surface lines.

Advocacy of passage by Legislature of proposed constitutional amendment to exempt from the city's debt limit the $275,000,000 expended in the original subway as self-sustaining, and use of the credit that might be thus released in the future to borrow money to help pay the cost of the proposed independent subway system.

No connection of new subways with either the present B.-M. T. or Interborough system, and no perpetuation in that way of what the Mayor calls "a bad business bargain for the city" in the dual subway contracts.

Condemnation of and promise of continued opposition to the Transit Commission's plan for the reorganization of the transit companies of the city into a unified system, which the Mayor characterizes as "a scheme to loot the public" by making the riding public pay for lines "about to be scrapped."

The two previous days John H. Delaney, chairman of the Board of Transportation and Mayor Hylan's chief adviser in transit matters, was on the stand. Mr. Sherman's questions were directed particularly toward bringing out the salient points of the connection of Mr. Delaney with transit matters, first as transit construction commissioner, later as adviser to Mayor Hylan and more recently as head of the city Board of Transportation under the Mayor. Mr. Delaney simply would not permit himself to be jockeyed into a position of criticism with respect to saying anything that might be interpreted as a direct reflection upon the Mayor. He said:

The Mayor makes so many statements I can't keep track of them all. Please do not ask me to comment on the Mayor's action. He was free to do as he chose, and as he is able to speak for himself, I do not want to criticise any one.

## Bitter Words Over Cleveland Bus Proposal

### Ohio Commission Hears Objections to and Arguments for Bus Lines to Compete With Cleveland Railway—Expert for Bus Applicant Severely Grilled—Manufacturer Denies Connection With Applicants

HEARINGS have been conducted during the last two weeks before the Ohio State Public Utilities Commission at Columbus on the application of the People's Motor Bus Corporation, Cleveland, for a certificate of convenience and necessity to operate buses in Cleveland. The application was opposed by representatives of the city of Cleveland, the Cleveland Railway, the Cleveland Chamber of Commerce and other civic and commercial organizations. All these interests took the position that if buses are to be operated in Cleveland they should be run by the Cleveland Railway. The Clevelanders also contend that under the home rule provision of the state constitution the right to grant permission for bus operation in Cleveland lies with the City Council rather than the State Utilities Commission.

Two years ago, however, the State Legislature passed the so-called Collister-Freeman law, which gives the State Utilities Commission control over bus applications. The commission contends that under this act it has the right to grant permission to bus operators in Cleveland. Cases now pending in the State Supreme Court, however, may determine whether the state commissions or city councils have the right to control bus operation within municipalities.

Representatives of the city, including City Manager W. R. Hopkins, Mayor Clayton C. Townes and members of the utilities committee of the City Council, are attending the hearings in Columbus opposing the application of the People's Motor Bus Corporation. They claim that if a company other than the Cleveland Railway is allowed to operate buses in Cleveland, it will mean financial ruin for the Cleveland Railway.

Joseph L. Rhinock, Cincinnati, and E. F. Sims, St. Louis, are the principal backers of the People's Motor Bus Corporation. They were represented at the hearings by Attorneys John Campbell, Cincinnati, and R. W. Sanborn, Cleveland. Messrs. Rhinock and Sims were also the backers of the People's Motor Bus Company, St. Louis.

Henry M. Brinckerhoff, New York, appeared as an expert witness for the Cleveland People's Motor Bus Corporation. He was subjected to a severe cross-examination by Attorneys Harry J. Crawford and City Councilman Fielder Sanders, former city street railway commissioner.

The Cleveland *Plain Dealer's* staff correspondent, W. M. Tugman, tells of this cross-examination partially this way:

Challenging the reliability of the engineer, Mr. Crawford defied him, in the light of past statements recommending unified management and control of urban transportation facilities, to answer this question:

"Is there any public convenience to be served by the granting of a license for bus operation in Cleveland to the Cleveland People's Motor Bus Corporation?"

Opposing counsel objected, and the commissioners ruled that this question as stated was one which they would answer in their own way in due time. Mr. Crawford made the question the general one of a permit to any competing company.

"I want the answer, 'Yes or No.'" he said.

"Object! Object!"

The commission ruled the witness should answer in his own way.

"You have two questions," said Mr. Brinckerhoff. "I have said I believe buses would supply a convenience the street railways do not now supply. The rest is a matter for the city and this commission to determine."

There was turmoil as Mr. Crawford demanded the answer be stricken out.

"Should a license be granted to any competing company? I don't care to whom, I want your opinion, as the expert of the $36,000 report."

"On which we made nothing," retorted Mr. Brinckerhoff.

"Perhaps it was worth nothing."

Followed a bitter argument in which Mr. Crawford pleaded with the commission to compel Mr. Brinckerhoff to give him a specific answer.

"This man doesn't dare to answer my question," said Mr. Crawford. "In view of his reports he's got to say that two competing systems would be ruinous. He's got to admit that if we let this concern in we sooner or later will have to buy them out at 100 per cent profit."

The commissioners said they didn't think the witness should be unnecessarily embarrassed. Mr. Crawford said he thought the importance of the situation demanded a stretch of the usual decorum.

"If this man says 'yes,'" shouted Mr. Crawford, "I'll hang him on his own reports. If he says 'no' he ruins his previous testimony. I don't care which he does, but I do want to know how far he'll stultify himself because his credibility is in question."

"Overruled."

Mr. Crawford went back to his questions from Mr. Brinckerhoff's past recommendations on unification of service and reshaped his question to read:

"Do you know of any reason why buses should not also be included in unification of service which you say you still advocate for rail systems?"

Again and again and again he thundered the question in a dozen different forms, the witness declaring that a multitude of circumstances made positive expressions impossible.

"Let's turn back to the high-priced report," said Mr. Crawford. "In 1919 you said: 'Unification of all transportation systems cannot be too strongly urged.' Do you stand by that now?"

"Yes."

"Do you know any reasons why bus operations should be excluded from that recommendation?"

"No."

### YELLOW COACH MAKES STATEMENT

It has been talked around Cleveland that the Yellow Coach Manufacturing Company was behind the People's Motor Bus Corporation. This was denied in a telegram to J. J. Stanley, president Cleveland Railway, by John Hertz, chairman of the board of the Yellow Coach Manufacturing Company, Chicago, as follows:

I should like to have the Public Service Commission of Ohio, the city authorities, the press, the citizens of Cleveland and your good self and associates understand that neither I personally nor anyone associated with me in the various enterprises which I have the honor to represent is in any manner morally or financially identified with or interested in the activities of Messrs. Rhinock and Simms in their present efforts in Cleveland to procure the necessary legal rights for the installation of a motor coach service. On the contrary, we are wholly out of sympathy with what they are attempting to do there and I sincerely regret and resent the inference which apparently they permitted to get abroad without emphatic denial that we were associated with them in this undertaking. This applies not only to Cleveland, but to their activities in Toledo and any other city in America where they may be engaged in similar undertakings. Messrs. Rhinock and Simms are minority stockholders in the People's Motor Bus Company, St. Louis, the management of which recently came under our control. Other than this I have not now or have I ever had any business dealings or business interests in common with either Mr. Rhinock or Mr. Simms.

It was announced on Dec. 24 that the State Public Utilities Commission has continued until Feb. 11 further hearings on the bus applications of both the People's Motor Bus Company and the Cleveland Railway.

## Survey of Transportation to Be Made at Yale

An extended study of the transportation problem in its engineering and economic aspects is to be conducted at Yale, beginning early next year. Official announcement to this effect was made on Dec. 5. The purpose is to determine what program of graduate studies in transportation at Yale is best adapted to the needs of the country and to the personnel and facilities at the university's command. The instruction and research done by other universities and technical schools will also be examined. The survey will be under the direction of Winthrop M. Daniels, professor of transportation; Charles J. Tilden, professor of engineering mechanics, and Samuel W. Dudley, professor of mechanical engineering.

The announcement also said that there will be regularly five Strathcona fellows in transportation at a stipend of $1,000 each, whose appointment is made possible by the fund received by the university in 1914 under the will of Lord Strathcona and Mount Royal. From this fund, which has already provided for two professorships, the Yale Corporation has also established two undergraduate scholarships, each of $600, payable to students showing efficiency and promise in the economic or engineering phases of transportation.

All branches of transportation, on water, land and air, will be considered in this survey, and special attention will be given to the study of their relationship and possibilities of their correlation.

## Strike and One-Man Car Suit Are Problems in Dayton

The six street railways of Dayton face a complex situation at present. Five of them are encumbered by litigation arising from the ordinance against the one-man car passed at the referendum election in November, 1923. The status of the litigation is indeterminate as regards the continuance of the injunction in force at present against enforcement of the ordinance, but it will probably be dragged out for some time no matter which side scores first in the fight now in the federal court.

Victory for city attorneys will bring a situation that means barring off the streets about $90,000 worth of rolling stock, which, under the present financial conditions of the companies, will deal them a heavy blow. Victory for the companies will permit them to continue operation of one-man cars but with yet other troubles to combat.

One of these is the labor problem. A strike exists now on the Dayton Street Railway. The road is being operated, but the loss of 30 skilled operators was a blow. Though cars are running on regular schedule, the effect of the strike is to divert considerable travel from this state. The People's Railway employees, belonging to Union No. 810, did not go out but the threat will always exist unless some settlement is made with them.

These two roads were the only ones under union organization. Both locals took a strike vote for use as a weapon by their executive committees. The specific demands were for an increase of pay and for adoption of an association contract, which virtually meant a "closed shop" condition. The men had been getting 55 cents an hour and wanted 75 cents.

Union men say that organization is proceeding also on the City Railway, Oakwood line and the Dayton, Springfield & Xenia Southern. At present, these roads employ their men under individual contract binding them not to organize or join a union.

One of the roads, the D. S. & X. S., is operating under a receivership. Technically, Dayton has a 6-cent fare in cases where a transfer to another line is used. One cent is charged for a transfer. The cash fare, however, for a single ride is 5 cents.

The one-man and wage issues in Dayton have been referred to previously.

## Chicago Attorneys Prepare Ordinances for February Ballot

Skeleton ordinances providing for transportation referendums in Chicago in February are being drawn by city attorneys as a legal step toward getting a purchase proposal on the ballot. The ordinances will be completed in detail by Jan. 15, next, for passage by the City Council and a campaign probably will be made to get the voters to agree to a purchase of the Chicago Surface Lines at a figure around $162,000,000. All figures will be in blank until the completion of the surface lines appraisal.

The administration announced that in the event the appraisal is not satisfactory to the Mayor, an alternate ordinance will be submitted, but in either case a subway will be provided for. The main ordinance will call for issuance of around $400,000,000 municipal traction notes, to be known as Schwartz certificates, which will pay for the surface lines, a downtown subway and outlying extensions. The estimated price of the elevated, $90,000,000, also is included but no steps have been taken to get an appraisal of the lines.

## Wisconsin Commission Has Jurisdiction Over Proposed Road

New developments have taken place in connection with the proposed plans of C. D. Smith, Fond du Lac, president of the Southern Wisconsin Railroad, to build an electric railway from Madison to Sturgeon Bay, via Fond du Lac and Manitowoc.

The Wisconsin Supreme Court on Dec. 9 upheld the Wisconsin Railroad Commission in its decision requiring this line to obtain a certificate of convenience and necessity in spite of the fact that a charter for the line was obtained from the Legislature in 1897 before the commission came into existence. Mr. Smith maintained in his appeal from a lower court that the charter was a sufficient substitute for the certificate required. The commission will have to approve the certificate of necessity before it authorizes the line's proposed bond issue of $5,700,000.

Work has started on the line near Manitowoc. Future progress depends upon action taken by the commission.

## Massachusetts Business Body to Demand Bus Regulation

The Association of Chambers of Commerce of Western Massachusetts has voted to instruct a committee to draft a resolution which will express a demand for legislation regulating bus operation and tending to increase taxes levied on buses.

B. A. Hapgood, secretary of the Springfield Chamber of Commerce, said the failure of railroads to take advantage of their opportunities was encouraging travel by automobile. Ray Baker of Boston, secretary of the Massachusetts Auto Dealers and Garage Association, said the bus owners were willing to co-operate in every practical way with the electric railways and the railroads and that they were ready to pay their proportionate share of taxes for highway maintenance. He said buses should be regulated.

Clark V. Wood, president of the Worcester Consolidated Street Railway and the Springfield Street Railway, said the buses were taking the most profitable short-haul business and that they were so increasing street congestion as to interfere with efficient operation of electric railway cars. He declared that any marked increase of bus service would entail intolerable congestion in the centers.

## P. R. T. Offers Ground

The Philadelphia Rapid Transit Company has offered to the city as a gift the Burd tract at 65th and Market Streets as a suitable location for the construction of the Municipal Stadium. The acceptance will rest with the City Council. The Mayor has under consideration an alternative proposal from the Philadelphia Rapid Transit Company for the entire tract on condition that the city accept it subject to a $300,000 mortgage.

## Aurora Line to Expand Following Shift in Population

Migration of Chicago's downtown workers westward has resulted in the need for the expansion of the facilities of the Chicago, Aurora & Elgin Railroad, which operates a system of third-rail lines of more than 100 miles connecting Chicago and many populous villages in Cook and Page Counties, Ill. In order partially to meet the cost of new work the company has arranged to sell $775,000 of two-year notes to be offered publicly by the bankers after Jan. 1.

Thomas Conway, Jr., president, said part of the money would be spent to build an artistic brick station in Glen Ellyn, where citizens enlisted the electric line in a city beautification program after seeing what the line had done for Wheaton. The Wheaton station is said to be one of the handsomest in the country and is the first of several by which the line hopes to set a new standard for interurban stations.

New block signals will be installed and there will be flash signals for crossroads. A new freight station will be erected in Elgin. The railway has purchased a 1,300-ft. frontage on Broadway, Aurora, and plans to take tracks off the streets inside the city and relocate them along the bank of the Fox River.

Records kept by the railway for 1921-1924 show that the main towns served have doubled in population in three years and that the number of houses in all communities served has increased 79 per cent.

## Reconstruction Program in Oakland Progressing

In fulfillment of part of its construction program, recently entered upon, the Key System Transit Company, Oakland, Cal., expects to receive soon 12 new cars intended for use in its service to the ferries. These are the first cars purchased by the company in two years. The previous purchase was of 55 cars of the one-man, two-man car type. It was intended to operate these cars by a single man, but owing to protests against their operation the cars were never used as originally intended. They are now in service under two-men operation.

The new cars are to be used mostly in two-car trains to replace others which are in need of repair. The traffic in the East Bay cities is growing so fast that during the rush-hour periods of each day practically every bit of rolling stock of the Key System is called into use.

Recently the company has been overhauling, repairing and repainting its cars. This work is still going on, but has proceeded slowly owing to the fact that the demands of traffic make it essential to keep as many cars as possible in service.

The Key System's construction program was undertaken in conjunction with the traffic survey instituted six months ago at the instigation of the city of Oakland. This survey has borne much fruit. As a result of it, buses have been purchased and placed in operation in Oakland and Alameda. It is now proposed to establish an additional bus line in West Oakland, linking that center with the manufacturing sections of Alameda and the estuary area, now inadequately served.

It also appears likely that the Oakland City Council will amend the Key System's franchise so as to give the company more favorable terms than are now enjoyed. This is still a matter of future action, but it is understood that the ground has been laid for a move of this kind and that the railway will make extensions and route changes that will greatly improve service.

A new loop system has been proposed for the business section of Oakland and several lines are likely to be extended to outlying sections of the East Bay if there is favorable franchise amendment action.

One of the changes in the franchise desired by the company relates to street paving. The present agreement specifies that the company must keep the space between its tracks properly paved. In accordance with this agreement the company is now making extensive track repairs and paving various streets, but it is pointed out by traction officials that these charges are unfair and really redound to the detriment of the car rider.

## Proposed Indiana Road Renews Application for Right to Build

An application for a further hearing on its petition for a certificate of public convenience and necessity to build an electric railway from Owensboro, Ky., to Elnora, Ind., with a bridge across the Ohio River midway between Owensboro and Rockport, Ind., has been filed with the Interstate Commerce Commission by the Owensboro, Rockport & Chicago Railway, a Kentucky corporation with headquarters at Owensboro.

The renewed application was filed following a report to the commission by C. E. Boles, attorney examiner, and E. Gray, engineer examiner, recommending that the application for a certificate be denied. The examiners reported that the company's estimates of anticipated traffic and revenues appeared to be excessive and that its estimates of cost of construction and of cost of equipment, particularly electric locomotives, appeared too low.

The hearing was held before the Indiana Public Service Commission at Indianapolis last September, at the request of the Interstate Commerce Commission. Officers of the company now state that they did not go more deeply into their estimates at that time because they misunderstood the purpose of the hearing. The Indiana commission recommended that the I.C.C. issue the certificate.

The proposed electric railway would be 84 miles long. The bridge across the Ohio was authorized by Congress last April. The company estimated its construction and equipment costs at $6,767,096, of which $2,125,000 would be for the bridge. It proposed to sell $2,500,000 common stock and $6,000,000 bonds to finance the project. E. T. Franks, Owensboro, is president of the company and Major Thomas H. Hazelrigg, a consulting engineer of Indianapolis, is chief engineer.

## Unexpected Answers to Appeal for Service Suggestions

That the use of the bus as a feeder to the lines of the Altoona & Logan Valley Electric Railway, Altoona, Pa., is appreciated by the patrons of the Logan Valley Bus Company, a subsidiary, is shown in the hundreds of answers received to a questionnaire sent out recently by S. S. Crane, general manager. The questionnaire sought suggestions from bus patrons.

The company now maintains eleven buses. Five are operated on regular schedule and six make special trips to relieve the railway during the congested hours. Patrons were almost unanimous in asking for extensions of the five bus routes, faster schedules and more buses.

Complaints were of minor details. One critic protested the "heavy odor of gas" inside the cars, another protested "speeding." One 8-year old, riding the school bus, wrote, "We think it lots of fun, especially the bumps." An afflicted individual wrote that the "steps were too high, especially for a rheumatic person."

The many ideas and suggestions received will be carried out as far as practicable.

## New Haven Against Buses

**Court Orders Sought by Railroad and United Electric Railways to Protect Their Rights**

Action was taken on Dec. 20 by counsel for the United Electric Railways, Providence, and the New York, New Haven & Hartford Railroad before Judge Chester W. Barrows in the Superior Court at Providence with bills of complaint against twenty corporations and persons operating bus lines in Rhode Island. The two transportation companies seek preliminary and permanent injunctions and restraining orders against the bus lines. A hearing on the preliminary injunctions was set for Dec. 29 in the Superior Court.

### Railway or Bus

In the bills of complaint the petitioners allege that if the buses are allowed to run it will mean a cessation of railroad facilities. The petitioners claim that the buses are under no regulation, and have asked for no certificates of public necessity and convenience; that the machines are not bonded and not inspected, that no one has control over the fares and the routes and that the buses should not be allowed to continue operations unregulated.

The basis of action is similar to that in a recent case in which William M. Oakley, doing business as the "Overland Limited" between Fall River and Newport, was enjoined from further operation of the line on the prayer of the Newport Electric Corporation under a rescript filed by Judge Barrows.

A. P. Russell, vice-president of the New Haven, said:

> The New Haven cannot longer stand by and see its property jeopardized by this sort of competition. The railroads and electric railways have been authorized to provide transportation for the people of New England. Under that authority the railroads have made an enormous investment.
>
> There may be room for a third transportation agency in New England, but not in the field covered by the railroads and electric railways. The New Haven management feels that any new forms of transportation should be adapted to the use of those existing organizations. Acting on that principle, it will leave no stone unturned to eliminate unfair and unwarranted competition.

Much interest attaches in transportation circles everywhere to the announcement made on Dec. 20 of a plan by which the Boston & Maine Railroad would undergo a physical and financial readjustment, discontinue approximately 1,000 miles of track, obtain $13,000,000 cash for improvements to the lines retained and organize its own motor bus and motor truck service to cover the territory where rail lines are abandoned. Of the 2,450 miles of road more than 1,000 miles handle only 3 per cent of the business. The plan was advanced as part of a general scheme of financial reorganization.

### Only Profitable Lines to Be Retained

Homer Loring, chairman of the executive committee of the railroad, is the author of the plan. It will be recalled that it was under Mr. Loring's direction that the Eastern Massachusetts Street Railway was rehabilitated. He cut off practically all of the unprofitable lines or those that give very little promise of soon becoming profitable, and then devoted his energies to the intensive development of the remaining lines with good results.

## Leavenworth Gives Railway Bus Franchise

The municipality of Leavenworth, Kan., delivered a bus franchise to the Kansas City, Leavenworth & Western Railways on Dec. 17. Conway F. Holmes, president, considered the terms of the franchise favorable, and believed the company would accept them.

An investment of $50,000 or $60,000 is contemplated, to place in service six 29-passenger buses, to operate over the same routes as covered by the railway tracks, which were in need of expensive renewals. The six buses will equal in number the cars that have been in service.

The Kansas City, Leavenworth & Western interurban line between Leavenworth and Kansas City is in better form than in several years, the freight business thriving and the passenger service not having shrunk more than one-fourth in the recent months of interurban bus development.

## Contracts Planned for Washington Heights Subway

Following a public hearing on Dec. 17 by the Board of Transportation of New York City on the terms and conditions of the contract for the construction of the Washington Hights subway, which is to be a part of the Manhattan trunk of the city's new subway system, it was announced that the contract drawings for two sections of the line from 111th Street to 131st Street had been completed and that invitations to contractors to bid on the construction would be ready for advertising during the week which will end Dec. 27.

One small section of the line has been under construction since last August.

The construction will be divided into fourteen contracts.

## Insurance Fund Impaired by Peculations

Caleb S. Jackson, for many years treasurer of the Eastern Massachusetts Street Railway, has resigned because of irregularities in his account with the Eastern Mutual Insurance Company, of which also he was treasurer. His resignation from both concerns has been accepted. Robert B. Stearns, vice-president and general manager of the Eastern Massachusetts, has been designated by the trustees to take temporary charge of the financial department of the railway.

From a careful examination of the accounts and securities of the Eastern Massachusetts it is learned that they are not impaired, or in any way affected, by the handling of the funds of the Eastern Mutual. Present information indicates an unlawful use of $48,000 of the funds of the Eastern Mutual, which is a subsidiary of the Eastern Massachusetts, organized wholly for the purpose of handling the workmen's compensation claims of the employees of the Eastern Massachusetts.

## Free Bus Restrained

**Future of Community Buses Up to California Commission—Electric Railways Seek Rights**

After the close of a two-day hearing before Commissioner W. J. Hanford of the California State Railroad Commission in Los Angeles, the Community-Merchants' Bus Service now awaits a decision from the state body as to its future existence. The operators of the free bus system have been defying the orders of the court by operating their buses from Los Angeles, Culver City and Venice without a certificate, but after they had been fined for contempt of court they decided to cease operations and apply for a permit to continue operations. They have also decided to offer no further resistance to the courts until the Railroad Commission has decided the matter.

### Railway Opposes Plan

The application of the Merchants' Bus Service, formerly known as the Community (Free Buses) Bus Line, was considered at a hearing based on an application of the Pacific Electric Railway. That company sought permission for a franchise to operate a bus line from Los Angeles to Culver City and Venice, but over a slightly different route from the one outlined in the application of the Merchants' Bus Service. The railway proposed to run its buses so as to connect with its electric cars at Los Angeles and operate along Washington Boulevard all the way to the proposed terminus at Venice. The railway planned to charge the same fares for its proposed bus line as are now charged on its electric interurban trains operated between Los Angeles and Culver City and Venice.

The Free Bus System seeks permission to continue its present schedule of fares, namely 10 cents from terminus to terminus. But the bus service is not rendered complete in going between Venice and Los Angeles, as the passengers are picked up or unloaded at the city limits of Los Angeles or at the end of the Los Angeles Railway's Washington Street line, whereby passengers are obliged to pay a 5-cent fare on the local car line in Los Angeles.

The electric line offers a system of fares which consists of round-trip rates, family, commutation and other special fares, which in some cases give rides for less than the bus men charge.

### Plea for Co-ordination

At the hearing J. Ogden Marsh, chief engineer of the Los Angeles Board of Public Utilities, stated that the Board of Public Utilities of Los Angeles was engaged in trying to unify into one system the local street car lines in Los Angeles of the Pacific Electric Railway and Los Angeles Railway, as well as all bus lines for improvement and continuity of service and to make universal transfers possible. For that reason, he said, the board favored the granting of bus line franchises to the street railways.

The Pacific Electric Railway informed the commission that it had eight new 29-passenger buses available for the new service, provided the commission approved of the railway's application.

## Inquiry Conducted Into Oakland Wreck

The worst accident in the history of East Bay electric train service occurred during the rush hour the morning of Dec. 4. A single car train of the Sacramento Short Line, westward bound, crashed into a four-car train of the Key System Transit Company on the Key line's fill a short distance from the Oakland mole. The Sacramento car telescoped the lighter rear car of the Key train half its length, killing six passengers and maiming 22 others. Subsequently two of the injured died in hospitals, bringing the death list up to eight.

Immediately after the accident investigations were started by the coroner, the State Railroad Commission and by each of the two railroads. The problem of fixing responsibility proved a knotty one, owing to the peculiar conditions under which that portion of the road on which the crash occurred is operated.

### Details of Operation Developed

The fill is the property of the Key System Transit Company, but is used jointly by the Key and Sacramento trains. The switches and safety devices are all under Key System control. Trains running on the fill are subject to the orders of Key officials. These facts were brought out at the hearing in the Key Building in Oakland the day after the wreck by H. A. Mitchell, vice-president and general manager of the Short Line. Mr. Mitchell produced a contract dated Jan. 20, 1911, in support of his testimony. E. E. Thornton, division superintendent of the Key System, however, denied that his company was responsible for what Short Line employees do while operating their own trains on Key tracks. To this Mr. Mitchell replied that no men are put on Short Line trains that operate over Key Line tracks until they have been passed upon by Key System officials. Manager Thornton accused the Short Line motorman of being in a previous crash with a Piedmont Key train at Fortieth Street and Telegraph Avenue. Mr. Thornton said:

> If the motorman of the Sacramento train had been working under Key System regulations there would have been no subsequent accident in which he could have participated, for the reason that he would have been disqualified from further service.

He further explained that all Key System trains are equipped with a "dead man" device.

Mr. Mitchell admitted that his train did not have such a device, but explained that it was equipped with other safety devices.

Testimony at the hearing showed that the signals on the fill were found to be in good working order after the accident. It was also brought out that the brake valves of the Short Line car were inspected before the accident and found to be in perfect working order. The brakes and brake devices, examined after the wreck, were found to be in excellent condition.

These points were brought out at the hearing:

1. That the Key train had come to a complete stop before the crash.
2. That the Short Line train went by at least two danger signals.
3. That it had been raining and the tracks were slippery.
4. That the crash came about 30 or 35 seconds after the Key train had stopped.
5. That the Short Line train was traveling at the rate of about 30 m.p.h. when first sighted by members of the crew of the stalled train.
6. That there was good visibility.
7. That both trains were late.
8. That there are no speed regulations on the fill.

Members of the board of inquiry named by the Key System and Short Line included:

Frank Mott, former Mayor of Oakland; Samuel Irving, former Mayor of Berkeley; J. C. McPherson, superintendent of the East Bay division of the Southern Pacific Company; W. Arnstein, president; L. H. Rodehaugh, traffic manager, and F. A. Miller, superindent of power and equipment of the Sacramento Short Line; W. R. Alberger, vice-president and general manager of the Key System Transit Company; J. P. Potter, superintendent of transportation of the Key Line, and W. P. Jackson, master mechanic of the Key.

Mr. Mitchell declared that the fact that the frame of the Short Line car was higher than the frame of the Key Line car accounted for the telescoping.

---

## Litigation in Spartanburg Officially Ended

The mandate of the Supreme Court of the United States, affirming the judgment of the Supreme Court of South Carolina in the case of the city of Spartanburg against the South Carolina Gas & Electric Company was filed in the office of the Supreme Court of South Carolina recently. This permanently ends one of the biggest cases that has ever been tried in Spartanburg. This was a proceeding in mandamus to compel resumption of street car service.

The case was practically settled by consent. Some weeks ago R. L. Peterman, manager of the Barstow interests in South Carolina, new owners of the South Carolina Gas & Electric Company, appeared before City Council and voluntarily agreed to withdraw their appeal. The city agreed to this, and under this arrangement the appeal was abandoned and ordered dismissed by the court.

The Barstow interests agreed to abandon the appeal of the South Carolina Gas & Electric Company from the South Carolina Supreme Court's decision on the ground that they did not care to be working under the disadvantage of a long-standing litigation.

The new company has petitioned for a 10-cent fare between Morgan Square and the city limits. A 10-cent fare has been in effect for some time on the car lines between East Spartanburg and Clifton. A 7-cent fare was charged within the city limits by the South Gas & Electric Company under the old ownership and prior to the discontinuance of car service in the city. Ten cents was also charged outside the city limits. At present a 10-cent rate is in effect on the buses. The new owners for several months have been at work rehabilitating the old car system.

## News Notes

**Court Allows One-Man Cars Temporarily.**—On the day that the ordinance prohibiting one-man car operation on the lines of the Connecticut Company in New Haven, Conn., was to become effective an injunction was obtained by George D. Watrous, representing the company, from Judge Isaac Wolf of the Superior Court permitting the present status of operation to continue until Jan. 6. The injunction enjoined the chief of police and city officials from attempting to enforce the provisions of the ordinance recently passed by the Board of Aldermen. The action of the board was referred to in the ELECTRIC RAILWAY JOURNAL, issue of Dec. 6. The hearing on Jan. 6 will be to determine whether the injunction shall be made permanent.

**Considers Utility Courses.**—The University of Oklahoma has under consideration the offering of utility courses in its regular curriculum. Such utility studies were recently added to the course of work in the University of Pennsylvania.

**Railway Service Wanted.**—More than 100 residents of Marlboro, Mass., have filed a petition asking the City Council to exert its influence to retain the service of the Worcester Consolidated Street Railway on the Northboro road section. The railway officials threatened to abandon service between Marlboro and Northboro if business fell off because of bus competition. The City Council decided not to restrict bus lines with reference to taking on and discharging passengers on the route between Marlboro and Westboro. The Marlboro Chamber of Commerce likewise is against any drastic change in the present transportation arrangements. The railway fare is 59 cents one way between Marlboro and Worcester, while Terry Carlstrom, bus proprietor, has announced he would sell 12 tickets for $4 or at the rate of 33⅓ cents a trip.

**Advertisements Told Strike Story.**—The Illinois Traction System, Chicago, Ill., told the story of the incidents leading up to the recent strike situation and its position in the matter by means of display advertisements in the papers in its territory and a series of letters to employees. By these means the people in its territory were offered every opportunity to know all of the facts concerning the situation. E. E. Soules, manager of the publicity department of the railway company, directed the work of placing the statement with the newspapers.

**Life Insurance Increased.**—Employees of the Kansas City, Leavenworth & Western Railway, Kansas City, Kan., have increased their group life insurance coverage by more than $63,000, bringing the total in force to about $150,000. Both the original and additional insurance policies were issued by the Metropolitan Life Insurance Company on the co-operative group plan, under which the railroad company and the workers jointly pay the premiums.

**New Franchise Increases Service.**—Interurban service between Cleveland and Bedford, Ohio, will be increased by the Northern Ohio Light & Traction Company and the fare increased by 5 cents. This follows a referendum vote of approval on a new franchise for the company by the voters of Bedford.

**Court Dismisses Old Suit.**—A suit involving reversion of the Omaha & Council Bluffs Street Railway's property to the city of Omaha, Neb., and popularly supposed to be still on a District Court docket, subject to an order to reopening, was dismissed at the city's cost by the court on Dec. 11. This suit grew out of the first franchise grant made to the Omaha horse railway in 1867. The grant specified that the property of the company should revert to the city after 50 years. The company was absorbed by the lines that went later into the present system.

**Fares Lowered.**—The Maine Public Utilities Commission has rendered a decision permitting the Androscoggin & Kennebec Railway, Lewiston, to make changes in its fare zones which will give many patrons a 10-cent reduction on every trip because of the extended fare limits. In view of the fact that the proposed changes in the fare zone limits would result in an extension of the present fare limits and would be of mutual benefit to the petitioner and patrons, the commission said it would approve the petition.

**Will Petition for Charter.**—Judge J. Moss Ives, receiver of the Danbury & Bethel Street Railway, Danbury, Conn., and others associated with him will petition the Connecticut General Assembly for a charter to operate an electric railway system and power generating plant. The company will be designated as the Danbury & Bethel Power & Transportation Company, and if authorized may take over the company now operating, foreclosure of which has been ordered by the court on the petition of first mortgage bondholders. It is also proposed to take over charters of the Danbury & Bethel Traction Company, and the Bridgeport & Danbury Electric Railway.

**Old Equipment in Service.** — The Illinois Power & Light Company has placed a bus in service between the center of Des Moines and the power plant of the company located some 6 miles southeast of Des Moines. The bus was one acquired from some of the original bus operators in Decatur, in which city the company has co-ordinated the railway and bus service. The bus is used merely to haul the workmen between the plant and the city. The company has also placed in service between South Omaha, Neb., and Ralston, three buses acquired from the old equipment in Decatur at the time of the purchase. These three buses supplement service to the interurban line between the two towns.

**New Proposal Offers Bus.** — The Philadelphia Rapid Transit Company, Philadelphia, Pa., has requested permission of the Delaware River Bridge Joint Commission to operate a bus route across the Delaware River Bridge, connecting Philadelphia with a suitable place in Camden. The plan would afford passengers the same fares and transport privileges as obtain now in Philadelphia. The company wrote to the Delaware River Bridge Joint Commission a few months ago asking to extend the transportation system, offering both street car and bus service. Later, at a hearing before the executive committee of the Bridge Commission, details of the proposed service were discussed. Since that meeting the company has been requested by the Reading Railroad to consider a bus route over the bridge to Camden which would give service to the Reading's new Camden terminal.

**Christmas Checks for Safe Work.**—Christmas letters in the form of checks were received recently by 321 motormen, conductors and operators of the Nashville Railway & Light Company, Nashville, Tenn., as a bonus for their work in the safe operation of street cars for the past three months. The amount paid out by the company this quarter was $3,140, increasing the total bonus payments in the safety campaign for the past 11 months to $7,383. According to John J. Connors, safety director of the company, the safety campaign has been responsible to a great extent for the 60 per cent reduction in street car accidents since 1920.

**Wants Fare Increase.**—Officials of the Milford & Uxbridge Street Railway, Milford, Mass., recently asked the State Department of Public Utilities for an increase in fares from 10 cents to 13 cents with the right to sell nine tickets for $1. Children's and workmen's fares would not be increased. The officials claimed that no dividends had been paid since 1916 and that this year no taxes could be paid or interest on loans.

**Placards Will Tell Story.**—Councilman Philip Tindall will ask the City Council of Seattle, Wash., to provide for printing placards to set forth the financial progress of the Seattle Municipal Railway. He states that Seattle's railway has spent approximately $2,000,000 in rehabilitation of the system since the property was taken over by the city on April 1, 1919; this in addition to the paying of all operation and maintenance expenses, paying off bonds and meeting interest payments. He plans to acquaint the people of the city with the true status and accomplishments of the line since it became city property.

**Spencer Circulates Car Petitions.**—Petitions are now in circulation in Spencer Mass., for presentation to the Worcester Consolidated Street Railway to show that there is sentiment for restoration of the lines to Leicester and Worcester, Mass., discontinued some months ago. It is proposed to open the question to general discussion at the town meeting in March.

**Wins Road Ownership.**—Cliff Little of Gadsden, Ala., is awarded the property of the Gadsden, Bellvue & Lookout Railroad, in North Alabama, in a case decided by the Circuit Court at Gadsden, Ala. on Dec. 15. The road operates from Gadsden, Ala., for several miles through the mountain section of North Alabama. It was alleged that the owners refused to refund money paid out by him for running the road or give him possession of it. Under the decision of the court the owners may hold the road in the event they immediately refund this money, together with interest and attorney fees. Otherwise the road becomes the property of Mr. Little.

**Expert's Report Awaited.**—Milo R. Maltbie, New York, has been engaged by the Cincinnati, Ohio, Chamber of Commerce as the expert adviser of that organization's traction committee. Mr. Maltbie has started his work and expects to have a preliminary report ready by Jan. 1 on the traction situation in Cincinnati.

**Bonus Checks Distributed.** — Bonus checks totaling $106,680 were distributed to 2,330 motormen, conductors and safety car operators on Dec. 15, under the merit and bonus system of the Los Angeles Railway, Los Angeles, Cal. This is the fifth Christmas season in which the bonus has been paid. A new high record is established in the amount paid and in the number of men receiving checks. The Christmas bonus is in the form of payment for special service rendered by trainmen during the year.

**To Grant Petition Would Be Discriminatory.**—Taking the view that a discriminatory action was being asked, the Board of Public Utility Commissioners of New Jersey denied the request of employees of the Pennsylvania Railroad for a modification of the Public Service Railway fare zones from Jersey City and the Meadow Shops at Kearney and from Newark to the Meadow Shops. The board held it would be unjust to change the zones in favor of these employees without extending the same privilege to all passengers. It said that while the present municipal zoning system might require modification in the future, such modification should not be made under this application.

**Wants to Run One-Man Cars.**—The Northern States Power Company has petitioned the Wisconsin Railroad Commission for permission to establish one-man car service on its line between Eau Claire and Chippewa Falls. At the hearing no opposition of residents was voiced.

**Urge Widening Woodward Avenue.**—Sidney D. Waldon, president of the Detroit, Mich., Rapid Transit Commission, recently stated his reasons for recommending the widening of Woodward Avenue, to be available for a four-track route. He believed that measures should be taken at once to adopt a uniform width of 120 ft. on the avenue from the Detroit River to the entrance of Palmer Park. The recommendations were made in a letter sent to the Woodward Avenue Improvement Association, which had asked for information as to the necessity of widening the thoroughfare. The association's letter, which was signed by John M. McKerchey, president, asked the commission to state the reasons it had to offer for recommending the expenditure of the sum required for the widening project. The Detroit *News* of Nov. 16 referred to the transit commissioners' suggestions.

# Financial and Corporate

## Plans Acquisition of Bus Company

**Detroit Street Railways to Serve Sections of the City Now Without Transportation Facilities**

The immediate establishment of bus service in certain sections of the city of Detroit and the ultimate taking over of the Detroit Motor Bus Company are in line with the new policy of the Department of Street Railways, according to a general outline of the transportation question by Mayor John W. Smith. Mr. Smith pointed out that the acquisition of the bus company's property must come eventually, and that the fact is realized by city officials and directors of the bus company.

The Department of Street Railways plans to have immediately a fleet of 25 buses to serve sections of the city which as yet have no transportation facilities and the bus service will be augmented as soon as the Council formally approves the purchase of the new double-deck buses recommended by the Street Railway Commission.

Before the city can proceed very far with plans for a complete and unified transportation system including street cars and buses, according to the mayor, legislation is necessary which will establish for the city the rights to its streets. The existing laws give the city the right reasonably to control the use of the public streets but an ordinance must be passed giving the city more complete control of the pavements. The mayor cites that at the present time a score of bus companies are operating into the city of Detroit from neighboring municipalities. The solution of this problem is one of the first to be faced by city authorities, the Mayor considers.

It is believed by Mayor Smith that the decision handed down by the Supreme Court in the case now pending concerning the right of the city to control its streets as far as the jitneys are concerned will pave the way for the passage of an ordinance relative to bus operation in the city.

To the Street Railway Commission will be left the working out of a proper system of bus transportation in the outlying districts. It is claimed that in some of the districts, citizens have to walk a mile or even farther to get to a street car. It is in these sections that the bus will be used to carry passengers to the car lines and transfers will be issued for the trip down town.

Immediate contracts for five buses from each of the three bidders who bid upon the city's request for proposals on 50 buses are urged by the Mayor and the Street Railway Commission but formal approval of this action has not yet been given by the City Council. The commission points out that immediate contracts should be let to insure delivery of the buses by spring. It is not anticipated that the buses will operate into the down town section for the present at least. They will be used only as feeders in connection with the car lines.

The Mayor believes that the eventual acquisition of the Detroit Motorbus Company's property is necessary in order that a maximum of service may be rendered the public. With the present company running equipment on parallel routes with the street car lines the most efficient service cannot be accomplished. It is pointed out that as the bus company is operating under a day-to-day agreement without a franchise, not much change would result from the city's acquisition of the bus company's equipment. Although the buses could be stopped from running on very short notice it is realized that a valuable service is being rendered by the buses and there is no disposition on the part of city officials to take any action that might result in discontinuing the bus service.

## Sale of 26-Mile Road Sanctioned

The property of the Interstate Consolidated Street Railway, Attleboro, Mass., is to be sold at public auction by Zenas W. Bliss, the receiver. Judge Crosby of the Supreme Court of Massachusetts has authorized the sale. As receiver Mr. Bliss asked for authority to sell on the ground that the company cannot earn its cost of maintenance; that it is unable to meet its obligations as they mature, and that it would be of no advantage to the creditors, stockholders or the public to continue the receivership. The road operates 26 miles of line from Plainville, in Wrentham, through North Attleboro and Attleboro to the Rhode Island line, and a line from Attleboro to Seekonk to the Rhode Island line. The sale will be held in Attleboro.

## $51,138 Below Return

**Rochester Lines Show Deficits on Railway and Bus Operations—3,000,000 Fewer Passengers**

For the fourth year under the service-at-cost contract the Rochester lines of the New York State Railways failed by $51,138 to get the 6 per cent return on their base value guaranteed by the contract. This fact was disclosed in the recent report of Charles R. Barnes, city railway commissioner, for the year ended July 31. The base value for the year covered by the report is stated at $19,573,606. The detailed results are shown in the accompanying table.

The returns are fixed at $1,162,598 for street car operations and $5,465, for the bus lines or a deficit of $41,890 and $9,249 respectively. The company began the operation of buses on Nov. 1, 1923. The shortage for the four years since the inception of the service-at-cost contract follows: First year, $133,998; second year, $94,001; third year, $47,642, and fourth year, $51,139.

Nearly 3,000,000 fewer passengers were carried for this year than in the preceding one, although 94,448 car-miles were run. This represented the high water mark since the signing of the contract. The unusually open winter, making possible greater use of autos, and adverse business conditions in the early part of the year are held responsible for the decline.

Commissioner Barnes commented upon the fact that the automobile affects the lines adversely in two ways, decreasing revenues by taking away passengers and by adding to the traffic congestion, retarding the movement of cars and increasing operating costs. The retarding of car movement has been acute since the city of Rochester installed a signal light control system on its main street, creating a problem for street cars and vehicles, particularly the former.

RESULTS OF OPERATION AT ROCHESTER FOR YEAR ENDED JULY 31, 1924

| | Railway | Co-ordinated Bus Lines* | Combined |
|---|---|---|---|
| Revenue from transportation— | | | |
| Passenger revenues | $5,027,845 | $41,117 | $5,068,962 |
| Miscellaneous transportation revenues | 2,533 | ..... | 2,533 |
| Total revenue from transportation | $5,034,081 | $41,920 | $5,078,011 |
| Revenue from other operations | | | |
| Station and car privileges | $49,562 | ..... | $49,562 |
| Rent from tracks and facilities | 42,297 | ..... | 42,297 |
| Rent from buildings and other property | 34,577 | ..... | 34,577 |
| Total revenue from other railway operators | $126,436 | $41,929 | $126,436 |
| Total operating revenue | $5,160,518 | $41,929 | $5,202,447 |
| Railway operating expenses | | | |
| Way and structures | $490,806 | $1,296 | $492,103 |
| Equipment | 402,758 | 4,890 | 407,648 |
| Power | 285,847 | 4,428 | 290,275 |
| Conducting transportation | 1,782,188 | 20,823 | 1,803,812 |
| Traffic | 14,375 | ..... | 14,375 |
| General and miscellaneous | 514,789 | 7,633 | 522,422 |
| Renewals and depreciation | 190,000 | 6,272 | 196,272 |
| Total operating expenses | $3,680,765 | $45,344 | $3,726,110 |
| Net revenues from railway operations | $1,479,752 | $3,415 | $1,476,337 |
| Auxiliary operations—revenues | 6,357 | ..... | 6,357 |
| Auxiliary operations—expenses | 5,467 | ..... | 5,467 |
| Net revenue from auxiliary operations | $890 | ..... | $690 |
| Net revenue from all operations | $1,480,642 | $3,415 | $1,477,227 |
| Taxes assignable to operations | 370,466 | 368 | 370,834 |
| Operating income | $1,110,176 | $3,785 | $1,106,392 |
| Non-operating income | 10,531 | . . | 10,531 |
| | $1,120,708 | $3,783 | $1,116,924 |
| Return on investment | 1,162,598 | 5,464 | $1,168,063 |
| Deficit | $41,890 | $9,248 | $51,138 |

* Bus operation started Nov. 1, 1923.

## Submits Report on Denver Tramway Operation

E. Stenger, receiver of the Denver Tramway, Denver, Col., recently presented the following report to the United States District Court covering operations from Dec. 24, 1920, when he was appointed receiver, to Oct. 31, 1924:

CONDENSED STATEMENT OF NET INCOME PERIOD DEC. 24, 1920, TO OCT. 31, 1924

| | Accumulative Dec. 24, 1920, to Dec. 21, 1923 | January to October, 1924 | Accumulative Dec. 24, 1920, to Oct. 31, 1924 |
|---|---|---|---|
| Total revenue from transportation | $14,136,741 | $3,733,107 | $17,869,848 |
| Total revenue from operation other than transportation | 514,900 | 162,308 | 677,208 |
| Total operating revenue | $14,651,641 | $3,895,415 | $18,547,056 |
| Total operating expenses | 9,802,256 | 2,542,433 | 12,344,689 |
| Net operating revenue | $4,849,385 | $1,352,981 | $6,202,366 |
| Total miscellaneous income | 36,462 | 20,910 | 57,372 |
| Gross income less operating expenses | $4,885,847 | $1,373,891 | $6,259,738 |
| Total deductions from income | 4,237,966 | 1,178,117 | 5,416,083 |
| Net income | $647,881 | $195,774 | $843,655 |

## Georgia Interurban in Danger of Suspension

Preston S. Arkwright, president of the Georgia Railway & Power Company, Atlanta, Ga., recently sent a letter to the Mayor and the Council of Marietta protesting the establishment of bus lines and warning that the interurban railway could not continue to operate under bus competition. The letter stated that granting permission to operate a bus between Atlanta and Marietta over a public highway supported in part by the railway was unfair and such operation was taking away essential revenue. He said that the Atlanta Northern Railway was opened for operation in 1905, and in every place possible along all parts of its route outside of incorporated cities it was built upon a private right-of-way bought and paid for by the railway. In the 19 years of its existence the company has not paid a single dollar in dividends, but has accumulated a floating debt of $145,000. In 1923 it failed by $11,550 to earn bare operating expenses, taxes and renewals. He said that the Atlanta Northern Railway could not face bus competition as the electric lines in Atlanta had been forced to face jitney competition. He said that there was no public convenience served by these buses and that their continuance would seriously hamper, if not completely destroy, the effectiveness of the electric railway.

## 276,460,074 Passengers Carried by Wisconsin Railways

The public utilities in Wisconsin have shown a steady growth with a total valuation on Dec. 31, 1923, of $376,679,440, according to the biennial report of the Wisconsin Railroad Commission for 1922-1923. This is an increase of 60.13 per cent over the $235,332,138.13 valuation of utility properties on June 30, 1917.

The electric railways showed losses in the number of passengers carried in the last few years. A high mark of 287,905,241 passengers was established in 1920 compared with 222,508,368 in 1917. In 1922 the total number of passengers carried during the year dropped to 262,110,613, while in 1923 the number of passengers carried increased to 276,460,074. Operating revenues increased from $11,323,223.38 in 1917 to $20,032,358 in 1922. Expenses, however, increased even more rapidly and the ratio of expenses to revenues rose from 74.61 per cent in 1917 to 84.6 per cent in 1922, and by the end of 1923 this figure had decreased only 1 per cent, although the revenues for 1923 had increased to $22,397,270.

## Discontinuance of Train Service Allowed in Niagara Section

Upon the assurance of the New York Central Railroad that it will sell commutation and special trip tickets good between Suspension Bridge and Lewiston at its ticket office at Suspension Bridge and that all tickets reading to or from Lewiston via New York Central will be honored on the Niagara Gorge Railroad and Niagara Gray Bus Line, the Public Service Commission on Dec. 12 permitted the New York Central to discontinue its train service between Suspension Bridge and Lewiston.

At a hearing on Nov. 7 on the commission's order to the Central to show cause why it should not continue service, it was brought out by the railroad that an arrangement had been made whereby the Niagara Gorge Railroad will operate cars between Niagara Falls and Lewiston in connection with New York Central trains. The Niagara Gorge Railroad also operates the Niagara Gray Bus Line, operating between Niagara Falls and Lewiston and beyond, giving practically a two-hour service each way. The commission reserves the right to direct the resumption of train service.

## Divisible Receipts Greater in Chicago

The Chicago Surface Lines announced a substantial gain in its 45 per cent of divisible receipts for November over the same month a year ago, though a slight falling off from October. The city gets 55 per cent of the net receipts. The Surface Lines share was $132,981 for November, 1924, against $86,685 for November, 1923, and $169,523 for October, 1924. The company's efforts to reduce operating expenses are shown in the comparison of $3,727,303 November expenses and $3,877,750 in October. Trainmen received $1,683,001 wages as against $1,785,503.

The number of passengers carried in November declined to 120,540,271, against 127,729,691 in October, but the average fare rose from 3.82 cents to 3.83. A compared income account for the two months shows:

| | November | October |
|---|---|---|
| Gross earnings | $4,710,210 | $4,963,509 |
| Expenses | 3,727,303 | 3,877,750 |
| Residue receipts | 982,986 | 1,085,759 |
| Joint account expense | 20,000 | 20,000 |
| 5 per cent interest on purchase price | 667,391 | 689,040 |
| Divisible receipts | 295,515 | 376,718 |
| City's share | 163,533 | 207,195 |
| Company's share | 132,981 | 169,523 |

## Conspectus of Indexes for December, 1924

Compiled for Publication in this Paper by

**Albert S. Richey**

Electric Railway Engineer

Worcester, Mass.

| | Latest | Month Ago | Year Ago | Since War High | Since War Low |
|---|---|---|---|---|---|
| Street Railway Fares* 1913 = 4 *4 | Dec. 1924 **7.17** | Nov. 1924 **7.17** | Dec. 1923 **6.89** | May 1921 **7.24** | May 1923 **6.88** |
| Street Railway Materials* 1913 = 100 | Dec. 1924 **148.7** | Nov. 1924 **148.6** | Dec. 1923 **155.5** | Sept. 1920 **247.5** | Oct. 1924 **148.5** |
| Street Railway Wages* 1913 = 100 | Dec. 1924 **220.8** | Nov. 1924 **220.7** | Dec. 1923 **216.4** | Sept. 1 20 **232** | Mar 1923 **206.8** |
| Steel—Unfilled Orders (Million Tons) 1913 - 5.91 | Nov. 30 1924 **4.03** | Oct. 31 1924 **3.53** | Nov. 30 1923 **4.37** | July 31 1920 **11.12** | July 31 1924 **3.19** |
| U. S. Bank Clearings Outside N. Y. City (Billions) | Nov 1924 **16.62** | Oct. 1924 **18.02** | Nov. 1923 **15.92** | May 1920 **18.54** | Feb. 1922 **10.65** |
| Business Failures Number | Nov. 1924 **1,460** | Oct. 1924 **1,573** | Nov. 1923 **1,613** | Jan. 1924 **2,231** | Sept. 1924 **1,277** |
| Liabilities (millions | **29.01** | **45.96** | **64.92** | **122.95** | **27.71** |

| | Latest | Month Ago | Year Ago | Since War High | Since War Low |
|---|---|---|---|---|---|
| Eng. News-Record Construction costs 1913 = 100 | Dec. 1924 **208.6** | Nov 1924 **205.7** | Dec. 1923 **217.3** | June 1920 **273.8** | Mar 1922 **162.0** |
| U.S. Bur. Lab. Stat. Wholesale Commodities 1913 = 100 | Nov. 1924 **152.7** | Oct 1924 **151.9** | Nov. 1923 **152.1** | May 1920 **247** | Jan 1922 **138** |
| Bradstreet's Wholesale Commodities 1913 - 9.21 | Dec. 1 1924 **13.53** | Nov 1 1924 **13.35** | Dec. 1 1923 **13.44** | Feb. 1 1920 **20.87** | June 1 1921 **10.62** |
| Dun's Wholesale Commodities 1913 = 120.9 | Dec. 1 1924 **193.6** | Nov. 1 1924 **193.7** | Dec. 1 1923 **190.9** | May 1 1920 **263.3** | July 1 1921 **159.8** |
| U.S Bur. Lab. Stat. Retail food 1913 = 100 | Nov. 1924 **150** | Oct 1924 **149** | Nov. 1923 **151** | June 1920 **219** | Mar 1922 **139** |
| Nat. Ind. Conf. Bd. Cost of living 1914 = 100 | Nov. 1924 **165.2** | Oct. 1924 **165.0** | Nov. 1923 **165.3** | July 1920 **204.5** | Aug 1922 **154.5** |

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population.

Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials.

Wages index is relative average maximum hourly wage of motormen, conductors and operators on 100 of the largest street and interurban railways in the United States, weighted according to the number of such men employed.

## Raleigh Company Not Reorganized

It was erroneously stated in the ELECTRIC RAILWAY JOURNAL, issue of Dec. 20, 1924, that the Carolina Power & Light Company, Raleigh, N. C., had been acquired by J. G. White Company and reorganized. The company acquired by J. G. White Company is the Carolina Light & Power Company, Aiken, S. C. The Carolina Power & Light Company operates the railway system in Raleigh, N. C., and also does a general lighting, power and gas business. The Carolina Light & Power Company is a power and lighting property. It does no railway business.

---

**Auction Sales in New York.**—At the public auction rooms of A. H. Muller & Sons there were sold this week $45,000 Shawnee-Tecumseh Traction Company, Shawnee, Okla., first mortgage 5 per cent 10-20 year gold bonds, due 1926; June, 1922, coupons on; 20 per cent.

**Short Line Given Up.**—Fitchburg & Leominster Street Railway has abandoned its 5-mile line between Fitchburg and Lunenburg, Mass. The action of the road was due to lack of patronage, which made operation a loss. Bus line owners are investigating the possibilities of operating between Fitchburg and Lunenburg.

**Income Lower.**—For the 5 months of the fiscal year ended November, 1924, the net corporated income of the Brooklyn City Railroad, Brooklyn, N.Y., was $595,493, against $792,341 for the corresponding 5 months in the last year. The passenger revenue for the 5 months ended with Nov. 30, 1924, totaled $4,708,989, while for a similar period in 1923 this item stood at $4,880,417. Expenses and taxes for the period this year were $4,090,439, which differed slightly from that of last year, when the figure was $4,048,268.

**Balance Lower—Bus Service Extended.**—For the eleven months ended Nov. 30, 1924, the gross income of the Republic Railway & Light Company, New York, N. Y., amounted to $9,557,946, against $9,027,895 for a similar period last year. The balance for depreciation, dividends and surplus amounted to $578,232 for the period of January through November of the current year and $635,363 for a similar period of 1923. The company, through its subsidiaries, operates 23 buses in interurban service and 57 buses in city service. Recently an important subsidiary, the Pennsylvania-Ohio Power & Light Company, started bus service between New Castle and Sharon. In the Nov. 29 issue of the ELECTRIC RAILWAY JOURNAL this company was inadvertently referred to as the Pennsylvania Power & Light Company.

**Approve Liquidation Plan.** — The stockholders of the Railways Company General approved a plan for the proposed liquidation of the company on Dec. 10. The property of the company is held by two corporations. The Railways Company General, which is a New Jersey corporation, has for some years held securities of several electric railways and accounts receivable, among which is the entire capital stock of the Victory Park Land & Improvement Company, Inc. The latter company is a New York corporation and was organized to hold the real estate owned by the Railways Company General. The assets of the Railways Company General will be transferred to the Victory company for an arbitrary consideration. Each stockholder of the Railways Company General can surrender his stock and take his pro rata share of the Victory company stock. As the capitalization now exists, this will give to each shareholder of Railways Company General two shares of Victory Company for one share of Railways Company General that he now holds.

**Revenue Up.**—For the eleven months months ended Nov. 30, 1924, the Philadelphia Rapid Transit Company, Philadelphia, Pa., had a net income of $1,895,868, against a net income in 1923 of $1,890,437. The passengers carried totaled 829,812,333 in the period from January to November, 1924, and 836,817,620 for the similar period in 1923. The passenger revenue from January to November this year amounted to $40,669,902 and for the 11 months of 1923 the amount was $40,265,921. Passenger statistics for November, 1924, the second full month of operation on the new fare, show that 74,087,646 passengers were carried, bringing a revenue of $4,010,418 against a revenue in November, 1923, of $3,771,562. The number of 8-cent fare passengers during November this year was 2,833,384. The 7½-cent token passengers totaled 48,581,229. The 5-cent fare zone line passengers numbered 1,100,404. Transfer passengers totaled 18,835,463.

**Abandoned Property to Be Sold.**—All the property of the Nevada County Traction Company, which formerly operated between Nevada City and Grass Valley, Cal., will be sold Jan. 17, 1925, by Frank Steel, commissioner named by the Superior Court. The sale is to satisfy a judgment of $67,000 obtained by the Mercantile Trust Company, San Francisco. Almost a year ago the company petitioned the California Railroad Commission for permission to abandon railway service. The property of the company was covered by a mortgage which was ordered foreclosed and sold by the Superior Court.

**Ordered to Sell Power Equipment.**—The receivers for the Dayton, Covington & Piqua Traction Company were directed to sell three boilers in the company power plant at West Milton, Ohio, for not less than $4,500 in an order filed in U. S. District Court recently by Judge Smith Hickenlooper. The receivers in their application pointed out to the court that a saving of $10,000 had been recorded annually by purchasing their power from foreign sources.

**Commission Approves Issue.** — The Public Utilities Commission of the District of Columbia has authorized the Washington Railway & Electric Company to sell $1,850,000 of general and refunding mortgage 6 per cent, ten-year gold bonds, secured by mortgage of Nov. 1, 1923. The issue is for the purpose of retiring a similar amount of Metropolitan Railway first mortgage 5 per cent bonds, due Feb. 1, 1925.

**Appeals on Tax Decision.** — Judge Thomas Bailey of the County Court recently decided that the Lewistown & Reedsville Electric Railway, Lewistown, Pa., must pay $4,000 annually for ten years for use of the Juniata River bridge, between Lewistown and Lewistown Junction. Following this announcement the company decided it would discontinue service across the bridge on Dec. 31. Through the efforts of the Chamber of Commerce, the county, the railway representatives and business firm representatives met in the community hall to consider the company's action in suspending action over the bridge. Day & Zimmermann, Inc., manager of the railway, were represented by J. A. Dewhurst and Chester Wilson. The company made a report of its business. During the twelve months period ended Oct. 31, 2,230,000 revenue passengers were handled at an average fare of 6.58 cents. Of the more than 2,000,000 people who were carried during the past year, 434,000 rode on cars over the river bridge. The company has taken an appeal from the rental decision. It states that an agreement could come about by passing the tax to the users of the bridge, discontinuing the existing railway service as a losing venture and substituting buses.

**Boston Road Does Well.**—The Boston Elevated Railway, Boston, Mass., showed a profit for operations in November. Edward Dana, general manager, said that the road had "turned the corner." Receipts from fares on Dec. 20 were $126,844, the greatest in the history of the road. Wage increases granted recently were said to have been more than offset by reductions in the working force and economies in purchase and operations.

**Will Cease Operations.**—The Nassau County Railway, operating between the Long Island Railroad station at Sea Cliff and Sea Cliff village, notified the Public Service Commission on Dec. 22 that it will cease operation on Jan. 8. Arrangements are under way between the company and the Sea Cliff authorities for a bus service.

**Trolley Line Gives Up.**—The Warren-Bristol line of the United Electric Railways, Providence, suspended service on Nov. 23 and simultaneously a bus line was started. Three buses will be maintained during normal service and a fourth added during the rush hour.

**Earnings Lower.**—The gross earnings of the railway department of the Cumberland County Power & Light Company, Portland, Me., for eleven months of this year are $117,191 less than for a similar period last year. The November gross earnings of the railway department were $110,408 compared with $121,449 during the similar month of 1923. The decline in gross earnings is due, it is said, to the use of the automobile.

**Employees All Stockholders.**—C. H. Harvey, president and general manager of the Knoxville Power & Light Company, Knoxville, Tenn., recently announced that every employee was a company stockholder. Stock of the company paying a 7 per cent dividend was opened to public subscription on Sept. 1.

**Leaves Directorates.**—Colonel Sheldon Potter has submitted his resignation as city director of the Philadelphia Rapid Transit Company, Philadelphia, Pa. The two other representatives of the city on the board are Mayor Kendrick and Ernest Trigg.

# Personal Items

## Wisconsin Officials Take on New Duties

S. B. Way, vice-president Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has been named president of the Peninsular Power Company, which was recently acquired by the North American Company. A. K. Ellis, general manager of the Wisconsin Traction, Light, Heat & Power Company, Appleton, Wis., was named vice-president in charge of operations in addition to his duties with the Appleton properties.

For practically 25 years Mr. Way has been connected with the public utility business and during all that time he has been associated with the interests of the North American Company. Seven years ago he became vice-president and general manager of the Milwaukee property. At one time he had been actively engaged in the management of the Wisconsin Gas & Electric Company, the Watertown Gas & Electric Company, Burlington Electric Light & Power Company and other important utilities in Wisconsin.

A. K. Ellis, who has been named vice-president, was for many years secretary-treasurer and general superintendent of the Wisconsin Traction, Light, Heat & Power Company. He was made general manager in the summer of 1923. The properties recently acquired by the North American Company serve a number of communities in Wisconsin and northern Michigan, including Crystal Falls, Iron Mountain and Iron River.

## H. V. Bozell Joins Bonbright & Company

Harold V. Bozell, for the past two and a half years co-editor of *Electrical World* with W. H. Onken, Jr., has resigned, effective Jan. 1, 1925, to join Bonbright & Company, Inc., New York, investment bankers dealing almost exclusively in bonds and preferred stocks of electric light and power companies. During his five years with the McGraw-Hill Company Mr. Bozell has been co-editor of the ELECTRIC RAILWAY JOURNAL, editor of *Bus Transportation* and co-editor of the *Electrical World*.

Mr. Bozell's work with Bonbright & Company will be largely advisory, covering utility operations and technical matters, and his appointment represents an expansion of Bonbright & Company in the direction of maintaining more intimate contact with the light and power industry.

After his graduation from the University of Kansas, his native state, in 1908, Mr. Bozell spent nine years at the University of Oklahoma, where, as a professor, consulting engineer and secretary of the Oklahoma Utilities Association, he was very active in promoting technical education and public interests generally in the state. His good work there resulted in his becoming assistant professor at Yale University in 1917 and continuing in that position until he joined the McGraw-Hill staff. At Yale he developed graduate courses in public utility management and finance.

Mr. Bozell has been very active in association affairs. He takes with him to his new work the best wishes of his many friends, including those of his associates in the McGraw-Hill Company.

## C. Henry Dahl Promoted at Winnipeg

C. Henry Dahl has been appointed assistant general manager of the Winnipeg Electric Company, Winnipeg, Man. For the past twelve months Mr. Dahl has occupied the position as assistant manager, and prior to that time was statistician for the company. In his new position Mr. Dahl will have charge of the operating of the railway, electric and gas utilities, as well as the electric and railway business of the two subsidiary companies — the Suburban Rapid Transit Company and the Winnipeg, Selkirk & Lake Winnipeg Railway.



C. H. Dahl

Mr. Dahl is a graduate of the University of Wisconsin, where he specialized in railway transportation, public utilities, statistics, money, banking and other political economy courses. From 1917 to 1919 he worked for the Wisconsin Railroad Commission as case investigator in public utility cases. He joined the Winnipeg Electric Company as statistician in November, 1919, and in less than four years was made assistant to the vice-president. Later in 1923 he assumed the duties of assistant manager of the operating department.

Mr. Dahl's appointment follows the retirement of John Whitsell as operating manager of the company.

E. V. Caton, formerly electrical engineer, has been appointed manager of the light and power department.

## All Mr. Dahl's Time to Brooklyn Company's Problems

Gerhard M. Dahl, chairman of the board of the Brooklyn-Manhattan Transit Corporation, will hereafter devote his entire time to the affairs of that company. When Mr. Dahl became chairman of the corporation more than a year ago, he expected to devote only a part of his time to its affairs. The transit problems of Greater New York, however, during the past 18 months have become so important and absorbing that he has decided to devote all his time after Jan. 1 to the corporation in the hopes that he may be of service to the community in the further development of adequate rapid transit. He is retiring from the firm of Hayden, Stone & Company. His retirement from the firm, while a loss to it and a financial sacrifice by Mr. Dahl, will, of course, make it possible for him to carry out his plans—a work that Mr. Dahl's business associates believe will be of great value to the community. As they see it, both from the standpoint of civic benefit and business progress, the transit problems must be solved.

For more than two years now Mr. Dahl has devoted practically all of his time to this question and he has built up confidence in his ability and in his policies. On the occasion of his election as chairman of the executive committee Mr. Dahl said that he assumed the city officials would endeavor to co-operate with the officers of the company to the end that transit conditions might be improved. As for the public, his attitude has been to use all of the present resources of the company to improve the service and to satisfy the public as nearly as it is humanly possible to do so.

Charles Hayden has been elected to the board of directors and the executive committee of the railway.

## John Whitsell Retires

John Whitsell, operating manager of the Winnipeg Electric Company, Winnipeg, Man., since 1921, has retired from the railway field and gone to California with his family. His career did not begin with his assumption of duties as manager of the Winnipeg property, for it was in 1891 that he entered upon his utility work. In that year he joined the forces in the car service department of the Sioux City Traction Company, Sioux City, Iowa, now known as the Sioux City Service Company. Six years later Mr. Whitsell served on the Suburban Railroad, Chicago, as a shopman, later advancing to master mechanic and superintendent. When the County Traction Company, Chicago, combined with the Suburban Railroad to make the Chicago & West Towns Railway he was made general superintendent. At the time he went to Winnipeg he was general superintendent of the Chicago & Interurban Traction Company.

Charles H. Allen of Stone & Webster, Boston, has been appointed to a new position, comptroller Chicago Surface Lines, created by the board of operation. He will have entire charge of the financial affairs of the company.

**J. P. Hudson** has been appointed auditor of the Niagara, St. Catharines & Toronto Railway, effective Dec. 1, 1924. His headquarters will be at St

NOTICE ABOUT BINDING

Owing to an error in printing the issue of Aug. 30, some of the matter on pages 303 and 304 was duplicated in part of the edition and other matter was omitted. Corrected pages were mailed to all subscribers, as a supplement to the issue of Sept. 6. Those having their copies bound should see that the correct pages are used.

**Joseph A. Clair**, for many years with the New York Railways, New York City, but more recently with the Yellow Cab Company, has been appointed claim agent of the Fifth Avenue Coach Company, New York. Mr. Clair entered railway work with the Eighth Avenue Railway, New York, in 1898 as a conductor. He pushed forward through the position of starter, inspector, assistant superintendent and general inspector for the superintendent of transportation of the New York Railways organization. In 1910 he joined the legal department of the New York Railways as transfer expert. Later he was made chief investigator, in which capacity he continued until February, 1923, when he took charge of the credit department of the Yellow Cab Company sales agency.

**John O. Williams**, depot master at the Halsey Street depot of the Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y., has been appointed acting division superintendent of that depot. Mr. Williams' appointment follows the transfer of Division Superintendent R. A. Masters to the Fresh Pond depot, to take the place left vacant by the death recently of Division Superintendent Frederick J. Frey. Mr. Williams has been in the service of the Brooklyn company for more than thirty years.

**H. F. T. Erben** has been appointed assistant vice-president on the staff of Francis C. Pratt, vice-president in charge of manufacturing and chairman of the manufacturing committee of the General Electric Company, Schenectady, N. Y. Mr. Erben will continue as vice-chairman of the manufacturing committee. He has been identified with the General Electric Company since its early days. During 1914 he was made engineer of the Schenectady works and in March, 1916, was appointed assistant manager. Following Mr. Emmons' retirement as works manager in 1920, Mr. Erben assumed full charge of the works as manager, a position which he held until Jan. 1, 1923, when C. E. Eveleth was made works manager.

# Obituary

ton

for many
way opera-
engineer
at the age
from the
1887 and
-president
Camden &
e lease of
rvice Cor-
Harring-
operating
Company,
sident and
ern Penn-
, Pa. In
a member
e of the
ssociation.
ssociation

the Puget Sound Power & Light Securities Company, of the Stone & Webster organization, and a notable figure in Seattle's business and community life, died in Seattle on Dec. 12, following a short illness contracted immediately upon his return from an extended Eastern business trip. Mr. Dabney went to Seattle in 1900 with the Stone & Webster organization. Years ago, when the Stone & Webster interests owned and operated the railway lines in Seattle, Mr. Dabney was named assistant treasurer. At that time the company was known as the Seattle Electric Company. This position, as well as that of manager of the Puget Sound Power & Light Securities Company, he held up to the day of his death. He was also assistant treasurer of the Diamond Ice Company and the Renton Coal Company, subsidiary companies of the Puget Sound Power & Light Company. Mr. Dabney was born in 1853 at Fayal, Azore Islands, where his father was American vice-consul. After obtaining his early education at Fayal and Boston, including a course at the Massachusetts Institute of Technology, Mr. Dabney entered the foreign shipping business. Later, for a time, he was identified with coal mining, timber and railroad interests in Ohio and elsewhere.

**Thomas Benton Clawson**, one of the organizers and the first president of the Warren Street Railway and the Warren-Jamestown Street Railway, Warren, Pa., died at his home in Warren Dec. 11. He was 79 years old.

# Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

## Official Washington Sees Good Business Ahead

Public psychology is now inclining strongly toward an expansion of business. There is economic confidence and optimism everywhere. We may expect an active year in all lines of business during 1925. These are thoughts expressed by a high official in Washington.

Some think that we are at the beginning of an inflation movement. Official Washington is watching this very carefully for it was commented that this country cannot go through another cycle of inflation and deflation without wrecking some of the public organizations, and the Federal Reserve system would probably be the first. Thus no real inflation is likely to be allowed to go beyond the early stages.

There is also the further suggestion that we will not have any inflation because that does not come until after there has been total employment for a considerable period. We are not yet up to full capacity in our production and there is still a surplus of labor. The New York Stock Exchange was observed to be distinctly not an indicator fundamentally of business conditions. The recent sustained upward trend of the market was attributed, in the first instance, to the election, but beyond that to the fact that wealthy people cannot afford to sell their stocks at the present large profits on account of the necessity to show these profits in their income tax statement this year. This has caused a shortage of supply of stocks, which has tended to keep the market up.

In view of the great interest which has been shown by business and the public generally in the special studies made by the Department of Commerce in Washington, it may be said that the average of intelligence with respect to business matters generally is showing a distinct advancement. The Secretary of Commerce recently said, in commenting upon this, that "If we can develop in our people a high sense of

## Metal, Coal and Material Prices

| Metals—New York | Dec. 23, 1924 |
|---|---|
| Copper, electrolytic, cents per lb | 14.85 |
| Copper wire base, cents per lb | 16.875 |
| Lead, cents per lb | 9.60 |
| Zinc, cents per lb | 8.02 |
| Tin, Straits, cents per lb | 58 02 |
| **Bituminous Coal f.o.b. Mines** | |
| Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons | $4.125 |
| Somerset mine run, Boston, net tons | 2.15 |
| Pittsburgh mine run, Pittsburgh, net tons | 1.875 |
| Franklin, Ill., screenings, Chicago, net tons | 1.775 |
| Central, Ill., screenings, Chicago, net tons | 1.75 |
| Kansas screenings, Kansas City, net tons | 2.30 |
| **Materials** | |
| Rubber-covered wire, N. Y., No. 14, per 1,000 ft | $6.75 |
| Weatherproof wire base, N.Y., cents per lb. | 18.25 |
| Cement, Chicago net prices, without bags | 2.20 |
| Linseed oil (5-lb. lots), N. Y., per gal | $1.16 |
| White lead in oil (100-lb. keg), N. Y., cents per lb., carload lots | 0.157 |
| Turpentine (bbl. lots), N. Y., per gal | 0.84 |

economic understanding, we would rid ourselves of a large part of the problems that daily confront us." Such general understanding of economics will certainly tend toward governmental as well as economic stability.

## Two New Interlocking Plants

The Interborough Rapid Transit Company has placed an order with the Union Switch & Signal Company for the materials required to install an electro-pneumatic interlocking plant at 149th Street, New York City. The machine will be of the Model 14 type, having 24 working and 3 spare levers, equipped with lever lights on all switch levers. Electro-pneumatic high and dwarf signals will be used to direct traffic in the interlocked area, the switches being operated by a total of 16 switch and lock movements equipped with style "C" cut-off switch valves. These materials will be installed by the Interborough company's regular signal construction forces.

Another important installation will be made by the Union Switch & Signal Company on the Boston Elevated Railway, Boston, which has ordered materials for the installation of an electro-pneumatic interlocking plant at Tower "F," Dudley Street. All electric energy employed at this plant will be alternating current. The layout embraces 20 color light signals and 14 switches to be controlled from the interlocking machine, which will have 15 working levers. A track model having 47 lights is being provided to indicate to the towerman the occupancy by trains of the tracks through the plant and in the territory south to Eggleston Square station and north to Dover Street Station.

## Laconia Car Company Has Lower Profit

For the year ended Sept. 30, 1924, the net income of the Laconia Car Company, Boston, Mass., after interest charges was $4,753, against $237,254 in the preceding year ended Sept. 30. The total income amounted to $5,710 for the fiscal year ended Sept. 30, this year, compared with $313,615 for a similar period of 1923. Current assets at Sept. 30, 1924, amounted to $839,822 and current liabillities were $34,871, leaving a net working capital of $804,951. This item last year was $678,596.

## *Rolling Stock*

**New York Central Railroad, New York, N. Y.,** has ordered seven electric switching engines and two electric freight locomotives from the General Electric Company.

**Atlantic Coast Railway, Asbury Park, N. J.,** through the Atlantic Coast Transportation Company, a subsidiary, has purchased 17 new buses to be used along the New Jersey coast cities.

**Lewisburg & Ronceverte Electric Railway, Lewisburg, W. Va.,** according to R. M. Bell, general manager, is planning for the purchase of a gasoline motor car which will be used for freight service.

**New York State Railways, Syracuse, N. Y.,** expects to buy four more buses for relief purposes. A number of motor trucks will also be purchased for the establishment of a freight service between Syracuse and cities within a radius of 100 miles.

## *Track and Line*

**Pennsylvania Railroad, New York, N. Y.,** has been ordered by the Board of Public Utility Commissioners of New Jersey to provide a switch connection between its tracks and the proposed carhouse and shops of the Trenton & Mercer County Traction Corporation, Trenton, N. J. The railroad refused to lay the switch, claiming that it had leased ground there to a lumber company.

**Southern Public Utilities Company, Charlotte, N. C.,** is rebuilding ½ mile of track on Belmont Avenue incident to the paving of that street.

**Municipal Railway of San Francisco, San Francisco, Cal.,** has been authorized by the Board of Public Works to launch the $500,000 Judah Street extension. The board has authorized immediate improvement of 10 blocks on Judah Street between Thirty-first and Forty-first Avenues in preparation for laying tracks from the ocean along Judah Street to Cole and Carl Streets. This extension will connect with Market Street by way of the Eureka Valley-Sunset Mission tunnel.

## *Power Houses, Shops and Buildings*

**Columbus Railway, Power & Light Company, Columbus, Ohio,** is having plans drawn for a three-story repair and service building to cost $300,000, with machinery and equipment. It will be devoted to the repair of rolling stock, company automobiles, service cars and trucks.

**New York, N. Y.** — The Board of Transportation recently awarded to the Lustbader Construction Company, Inc., the contract for the construction of the foundations, retaining walls and embankment for the Corona Storage Yards on the Flushing subway at Hewitt Avenue and Riverside Avenue, Corona. The contract was for $235,934, which was the lowest bid received. The yards are designed to accommodate 200 cars of either the Interborough or B.-M. T. type. When completed the yards will have capacity for 700 cars, in addition to space for inspection sheds. The yards cover an area of twenty acres and under the terms of the contract will have to be ready for occupancy within a year.

## *Trade Notes*

**Stockbridge Machine Company, Worcester, Mass.,** has appointed the following direct sales representatives in their respective territories: D. J. Normoyle and Starr Equipment Company, in the Liberty Building, Philadelphia, Pa.; A. B. Starr in the Anott Building, Pittsburgh, Pa.; D. E. Morand Machinery Company, at 8784 Quincy Avenue, Detroit, Mich.

**Norma-Hoffmann Bearings Corporation, New York, N. Y.,** has moved its factory and general offices to its new plant at Stamford, Conn. The Long Island City office has been discontinued and all shipments will now be made from the Stamford plant.

**O. M. Bostwick** has resigned as New York representative of the publicity department of the General Electric Company and will probably resume his activities in the technical publicity field in New York City.

## *New Advertising Literature*

**Roller-Smith Company, New York, N Y.,** has issued Bulletin No. 530 illustrating and describing its new double-pole "interlocked trip" breakers and its new "shock-proof" circuit breaker. Data are included pertaining to different types of circuit breakers for different applications.

**General Electric Company, Schenectady, N. Y.,** has issued Bulletin No. 48732, "Electric Equipment for Cranes." This is an attractive 35-page leaflet, well illustrated with photographs, diagrams, tables and charts. It discusses the subject thoroughly, with particular reference to crane motors, control and brakes. Information is given on operating characteristics, and types of standard motors are listed in the bulletin.

**Crouse Hinds Company, Syracuse, N. Y.,** has issued folder No. 15 and bulletin No. 2058 describing "Wedgtite" pipe hangers. How pipes are clamped to or suspended from structural shapes is described.

**Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.,** has issued a new publication called "The Cleveland Railways—The Story of Its Operation and Maintenance." This book was prepared with the cooperation of officials of the railway and describes the entire system. The introductory chapter is headed "The Tayler Plan—Its Evolution and Provisions" and briefly relates the early traction history in Cleveland. Chapter I, "Track and Overhead Systems," describes briefly the practice and policies of the Cleveland system. "The Power System" is the title of Chapter II. This describes in detail the automatic substation practice on this city system, which enjoys the distinction of having used the first large capacity two-unit substations for metropolitan areas. The various types of cars in use at the present time are described in Chapter III, which also contains several paragraphs about the service. The Harvard Shops, which have always caused much comment because of their completeness, are described by departments in Chapter IV. Chapter V is devoted to the operating stations. The entire book is profusely illustrated. Copies of the book, known as Special Publication 1703, may be obtained free of charge from any Westinghouse district office or from the publicity department at East Pittsburgh.





# PEACOCK
## Staffless Brakes

## *Reasons why Peacock is preferred—*

***Maximum Braking Power***
***Ample Chain Winding Capacity***
***Least Platform Space***
***Simple Operation***
***Unfailing Reliability***
***Low Maintenance Costs***

## *You'll find them all Important*

Nearly quarter of a century building and installing hand brakes has established beyond question, the safety and reliability, the long satisfactory life and low maintenance costs of Peacock Brakes.

Due to their correct construction of properly selected materials, Peacock Brakes involve practically no expense for repairs and replacements.

The rapidity with which a Peacock Staffless Brake will bring a speeding car to a dead stop inspires confidence on the part of the motorman because he knows after a few trials that he can depend on the Peacock in emergencies.

Our engineers have specialized on the design of hand brakes and they have considered the problem from all angles. Peacock Brakes are specified by experts in rolling stock who do not depend on some one else's say so.

Peacock Brakes are designed with the "*safety* first" idea.

*Write us for details.*

**National Brake Company**
**890 Ellicott Square Buffalo, N. Y.**

***Canadian Representative***
**Lyman Tube & Supply Co., Ltd., Montreal, Can.**

# Bankers and Engineers


**Ford, Bacon & Davis**
Incorporated
**Engineers**
115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

**The J. G. White Engineering Corporation**
Engineers—Constructors
Oil Refineries and Pipe Lines, Steam and Water Power Plants, Transmission Systems, Hotels, Apartments, Office and Industrial Buildings, Railroads.
43 Exchange Place New York

**STONE & WEBSTER**
Incorporated
EXAMINATIONS REPORTS APPRAISALS
ON
INDUSTRIAL AND PUBLIC SERVICE PROPERTIES
NEW YORK BOSTON CHICAGO

**THE BEELER ORGANIZATION**
ENGINEERS AND CONSULTANTS
Traction-Traffic-Equipment-Power
COORDINATION OF SERVICE—IMPROVED OPERATIONS
INCREASED TRAFFIC—FINANCIAL REPORTS
APPRAISALS—MANAGEMENT
52 Vanderbilt Ave. New York City

**SANDERSON & PORTER**
ENGINEERS
REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS
RAILWAY, LIGHT and POWER PROPERTIES
CHICAGO NEW YORK SAN FRANCISCO

**ENGELHARDT W. HOLST**
*Consulting Engineer*
Appraisals, Reports, Rates, Service Investigation, Studies on Financial and Physical Rehabilitation Reorganization, Operation, Management
683 Atlantic Ave., Boston, Mass.

**ALBERT S. RICHEY**
ELECTRIC RAILWAY ENGINEER
WORCESTER, MASSACHUSETTS
REPORTS - APPRAISALS - RATES - OPERATION - SERVICE

**JOE R. ONG**
Consulting Transportation Engineer
*Specializing in Traffic Problems and in Methods to Improve Service and Increase Efficiency of Operation*
PIQUA, OHIO

**STEVENS & WOOD, INC.**
Design and Construction of Power Stations
Railroad Electrification, Industrial Plants
REPORTS AND APPRAISALS
*Management and Financing of Utilities and Industrials*
Mahoning Bank Bldg. Youngstown, O.
120 Broadway New York

**Dwight P. Robinson & Company**
Incorporated
Design and Construction of
*Electric Railways, Shops, Power Stations*
125 East 46th Street, New York
Chicago Youngstown Atlanta Philadelphia
Los Angeles Montreal Rio de Janeiro

**HEMPHILL & WELLS**
CONSULTING ENGINEERS
Gardner F. Wells Albert W. Hemphill
*APPRAISALS*
INVESTIGATIONS COVERING
Reorganization Management Operation Construction
43 Cedar Street, New York City

**DAY & ZIMMERMANN, INC.**
ENGINEERS
DESIGN - CONSTRUCTION - REPORTS
VALUATIONS - MANAGEMENT
NEW YORK PHILADELPHIA CHICAGO

**WALTER JACKSON**
*Consultant on* Fares and Motor Buses
The Weekly Pass—Differential Fares
Ride Selling
143 Crary Ave., Mt. Vernon, N. Y.

**Byllesby Engineering & Management Corporation**
208 S. La Salle Street, Chicago
New York Tacoma

The Most Successful Men in the Electric Railway Industry read the
**ELECTRIC RAILWAY JOURNAL**
Every Week

# Car Roofs of HASKELITE are 30% lighter

Chicago Surface Lines' last 100 cars, soon to go into service, have Haskelite roofs, truss planking and bulkheads. In every location it saves weight, increases strength and improves appearance. Reduced weight lowers the center of gravity, improves riding qualities and lessens operating costs as much as $50 per year.

**PLYMETL**

Is Haskelite with steel faces, making superior side panels, vestibule linings and letter boards. Besides being very durable, it posesses great heat insulating value and deadens sound. Resisting indentation, it is easier to keep in good condition than steel.

Chicago Surface Lines use Haskelite for roofs, head linings and interior trim.



*Send for Blue Print Booklet*

HASKELITE MANUFACTURING CORPORATION
133 W. WASHINGTON ST., CHICAGO, ILL.

---

The Most Successful Men in the Electric Railway Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

---

C. B. BUCHANAN, President — W. H. PRICE, JR., Sec'y-Treas. — JOHN F. LAYNG, Vice-President

BUCHANAN & LAYNG CORPORATION

*Engineering and Management, Construction, Financial Reports, Traffic Surveys and Equipment Maintenance*

BALTIMORE, 825 Equitable Bldg. — Phone: Hanover 2142 — NEW YORK, 49 Wall Street

---

JAMES E. ALLISON & CO.
Consulting Engineers
Specializing in Utility Rate Cases and Reports to Bankers and Investors
1017 Olive St., St. Louis, Mo.

---

Transmission Line and Special Crossing Structures, Catenary Bridges
WRITE FOR OUR NEW DESCRIPTIVE CATALOG
ARCHBOLD-BRADY CO.
Engineers and Contractors — SYRACUSE, N. Y.

---

Bureau of Commercial Economics, Inc.
*Industrial Engineers*
Organization · Methods · Layout and Facilities
Public and Industrial Relations
72 West Adams Street · CHICAGO

---

THE P. EDWARD WISH SERVICE
50 Church St. — *Street Railway Inspection* — 131 State St.
NEW YORK — DETECTIVES — BOSTON

---

HUMAN ENGINEERING
*Railway Audit and Inspection Company, Inc.*
*Franklin Trust Building, Philadelphia*
Boston, New Orleans, New York, Pittsburgh } BRANCHES { Baltimore, Chicago, Atlanta, St. Louis

---

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.



# Collier Service

A nation-wide organization building and sustaining car cardadvertising space values



**Barron G. Collier, Inc.**
Candler Bldg.
**New York**

# TIMKEN

## A Year of Progress—

Many interesting developments, many improvements in motor coach designing, have marked the calendar year now drawing to a close.

Timken-Detroit has participated in—and contributed to—this progress. Therefore, although the advanced types of motor bus differ in many respects, they agree in one—that their axles are built by this company.

THE TIMKEN-DETROIT
AXLE COMPANY
Detroit, Michigan



# AXLES

# NON-ROT SHELTERS

Tide Water Cypress "The Wood Eternal"



& NON-ROT PLATFORMS built of Tide Water Cypress "The Wood Eternal" are a very valuable contribution toward *Economy Records.*

***Economy Records*** figured over a period of years gain more by the *avoidance of repairs and replacements* than they can by any minor shaving of the original cost. True *"Tidewater" Cypress,* the only "Wood Eternal," is coming into its own as the ideal light structural lumber for *Railway Uses.*

*We recommend Cypress only for the applications in which it excels.*

WRITE FOR INFORMATION

**Southern Cypress Mfrs. Ass'n**

1265 Poydras Bldg.
New Orleans, La.

1265 Graham Bldg.
Jacksonville, Fla.

S C M A

*Identify "Tidewater" Cypress by the Arrow Trade-Mark.*



# Some One Wants To Buy

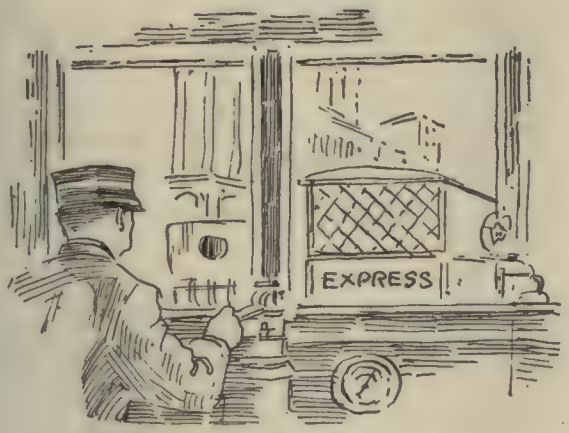
the equipment or machinery that you are not using. This may be occupying valuable space, collecting dust, rust and hard knocks in your shops and yards.

# Sell it

before depreciation scraps it.

*The Searchlight Section is helping others—*
*Let it help you also*

8057




## *Is a noiseless, vibrationless gear possible?*



Nuttall Helical Gear and Pinion

You have had visions of a gear — a quiet, smooth acting gear that would work without constantly jarring loose nuts, bearings, insulation and generally shortening the life of the motor and even the car itself.

This ideal has been realized in the Nuttall Helical Gear. This gear is virtually noiseless. It has been proven to be the smoothest, quietest and most enduring type of gear that can possibly be made.

If you really want noiseless cars and less maintenance work, investigate Nuttall Helical Gears. Our Gear book tells you all about them. Write for it.

**R.D. NUTTALL COMPANY**
**PITTSBURGH PENNSYLVANIA**

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

***Just Out!***




**It will pay you to see the new Richey**

The new 1924 Richey covers the latest developments—describes new methods—records changes in theory and practice. It covers every phase of electric railway work from Roadbed and Track to Signals and Communication. Therefore you should see

**The thoroughly Revised Second Edition of**

**RICHEY'S**

## Electric Railway Handbook

*798 pages, flexible, pocket size, 600 illustrations $4.00 net, postpaid.*

**By Albert S. Richey**

**Consulting Engineer, Professor of Electric Railway Engineering, Worcester Polytechnic Institute**

Electric railway executives, engineers and operating men have long respected Richey's ELECTRIC RAILWAY HANDBOOK as the one great pocketbook of practice data, formulas and tables in the electric railway field.

### Every Railway Man has a need for Richey

It should be in the reference library of every electric railway in the country. A few new ideas gleaned from one section of this helpful handbook will repay the small price of the book over and over again.

**CHAPTER HEADINGS**

1—Roadbed and Track
2—Car Houses and Shops.
3—Train Movement
4—Railway Motors
5—Controlling Apparatus
6—Current Collecting Devices
7—Trucks
8—Braking
9—Cars
10—Transmission and Distribution
11—Signal and Communication

***Examine the new Richey for 10 days FREE***

See this book for yourself. Examine it free. Look up some special topics of immediate interest to you. You can keep it or send it back as you think best. On that fair basis—send the coupon off today.

**McGRAW-HILL**
**FREE EXAMINATION COUPON**

*McGraw-Hill Book Co., Inc., 370 Seventh Ave., New York, N. Y.*

You may send me on 10 days' approval *Richey's Electric Railway Handbook, $4.00 net.* I agree to pay for the book or return it postpaid within 10 days of receipt.

Signed .....

Address .....

Official Position .....

Name of Company .....

(Books sent on approval to retail purchasers in the U. S. and Canada only.) E. 12-27-24

# DAYTON



## Joint Tie

Strengthen the joint and you get rid of many track troubles. The Dayton Resilient Joint Tie is designed to give additional strength to the most vulnerable part of the track, by supporting both rails on the same level and preventing battered and sunken rail joints.

Welding the rail to the top plate of the tie provides excellent current return. No other bonding necessary.

Thousands of these Joint Ties are in use. Write us.

The Dayton Mechanical Tie Co., 707 Commercial Building, Dayton, Ohio

Your Passengers Will Enjoy Their Ride On

## Hale-Kilburn Seats

Especially Designed for
One Man Safety Cars



*Lightest Weight Stationary Steel Seat*

**Lightest**
**Strongest**
**Simplest**
**Neatest**



*Lightest Weight Walkover Steel Seat*

*No higher in price than others*
*Write for particulars*

**Hale-Kilburn Company**
**PHILADELPHIA**

| New York | Chicago | Richmond | Atlanta | San Francisco | Los Angeles |
|---|---|---|---|---|---|
| 30 Church St. | McCormick Bldg. | Mutual Bldg. | Candler Bldg. | 903 Monadnock Bldg. | 320 S. Pedro St. |



# Quality Cars for Detroit

The illustration shows one of the twenty-five new Peter Witt type cars now being delivered to the Detroit Municipal Railways, equipped with St. Louis equalized trucks.

St. Louis "Quality Built" cars are used by the principal electric railways throughout the U. S. Every car is built with the same high quality of workmanship.

*Write for specifications*

Quality **St. Louis Car Company** Safety

St. Louis, Mo.

*"The Birthplace of the Safety Car"*



# Quick Accurate Permanent

***A Record of Each Sale When the Sale is Made***

The sale of electric railway transportation is strictly a retail business proposition and should comply with those methods which have been found most successful in other lines of merchandising.

The only safe method is to mechanically indicate and record the amount of each sale in the presence of the purchaser at the time the sale is made.

Ohmer Fare Registers indicate and record the exact amount and class of fare paid at the time it is paid. They apply to electric railroading the correct methods which have brought success to countless retail merchants.

**OHMER FARE REGISTER COMPANY**

**Dayton, Ohio, U. S. A.**

AMERICAN ELECTRICAL WORKS
AMELECTRIC
Wires and Cables
PHILLIPSDALE, R.I.

Reg. U. S. Pat. Office

Incandescent Lamp Cord

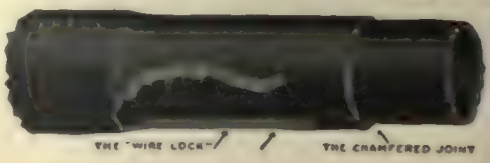
## AMELECTRIC PRODUCTS

BARE COPPER WIRE AND CABLE
TROLLEY WIRE
WEATHERPROOF WIRE AND CABLE
PAPER INSULATED UNDERGROUND CABLE
MAGNET WIRE

**AMERICAN ELECTRICAL WORKS**
PHILLIPSDALE, R. I.

Boston, 176 Federal; Chicago, 112 W. Adams; Cincinnati, Traction Bldg.; New York, 100 E. 42nd St.

## ELRECO TUBULAR POLES




COMBINE

Lowest Cost — Lightest Weight
Least Maintenance — Greatest Adaptability

Catalog complete with engineering data sent on request.

**ELECTRIC RAILWAY EQUIPMENT CO.**
CINCINNATI, OHIO
New York City, 30 Church Street

## J-P Products of interest to Electric Railways


NOARK Fuses


NOARK Fuse Clips CUTOUT BASES


NOARK Service and Underground Boxes


Railway and Mine hangers and insulators


J-P Molding Service (Central Rain)


VULCABESTON Sheet and Rope Packing

**JOHNS-PRATT CO. HARTFORD, CONN.**

## We are prepared

to handle any high grade proposition where

VARNISHED CAMBRIC
Wires and Cables
are required.

When using *quality* Wires and Cables use *quality* Tapes.
"MANSON" Tape, "OKONITE" Tape, "DUNDEE" Tapes.

**THE OKONITE CO., Passaic, N. J.**
Incorporated 1884

OKONITE
TRADE MARK

Sales Offices: New York—Atlanta—Pittsburgh—San Francisco.
Agents: Central Electric Co., Chicago, Ill.; Pettingell-Andrews Co., Boston, Mass.; The F. D. Lawrence Electric Co., Cincinnati, Ohio; Novelty Electric Co., Philadelphia, Pa.
Canadian Representatives: Engineering Materials Limited, Montreal.

TRADE

*For dependable Line Material that will give you maximum service use*

## ANDERSON

MARK

*Send for Latest Quotations*
Main Office and Factory, Boston, Mass.

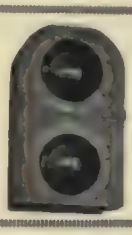



## ELECTRICAL WIRES AND CABLES

**John A. Roebling's Sons Company**
Trenton, New Jersey J-1707

## Chapman
## Automatic Signals

**Charles N. Wood Co., Boston**






STANDARD UNDERGROUND CABLE CO.
TRADE MARK

THE mark of quality in electric wires and cables and cable accessories.

*Write our nearest branch office.*

BOSTON NEW YORK PHILADELPHIA WASHINGTON PITTSBURGH CHICAGO DETROIT ST. LOUIS SAN FRANCISCO



## PEIRCE
**Railway Feeder Pins**

A strong Forged Steel Pin designed for heavy duty. Their low cost permits their use over the entire system.

**HUBBARD & COMPANY**
PITTSBURGH CHICAGO



## AUTOMATIC SIGNALS

Highway Crossing Bells
Headway Recorders
Flasher Relays

**NACHOD SIGNAL COMPANY, INC.**
LOUISVILLE, KENTUCKY.



## Shaw Lightning Arresters

*Standard in the Electric Industries for 35 years*

**Henry M. Shaw**
*150 Coit St., Irvington, Newark, N. J*

# Arc Weld Rail Bonds

AND ALL OTHER TYPES

*Descriptive Catalogue Furnished*

## American Steel & Wire Company

Chicago
New York
Boston
Cleveland
Pittsburgh
Denver
U. S. Steel Products Co.
San Francisco Los Angeles Portland Seattle

# ACME WIRE

PRODUCTS

Specify Acme Varnished Cambrics—they stand up under the most exacting demands of all electrical work.

ACME MAGNET WIRE
"Enamelite"—Plain enameled copper wire
"Cottonite"—Cotton-covered "Enamelite"
"Silkenite"—Silk-covered "Enamelite"
Magnet Wire—Cotton or silk, single or double

ACME COIL WINDINGS
Field Coils, Meter Coils, Ignition Coils, Windings for Audio and Radio Frequency Transformers.

ACME VARNISHED INSULATIONS
Varnished Cambrics—
Black and yellow
Varnished Silks and Tapes—
For every requirement
Varnished Papers—
Black and yellow
Varnished Tubing—
"Spaghetti", all sizes, 5 colors
"Celatsite" Wire—
Tinned, spaghetti-covered wire for radio sets; 5 colors
Insulating Varnishes

*Catalog sent Engineers and Executives*

THE ACME WIRE COMPANY
Main Office and Plant, New Haven, Conn.
New York 52 Vanderbilt Ave. Cleveland Guardian Building Chicago 53 W. Jackson Blvd.

B. A. HEGEMAN, Jr., President C. C. CASTLE, First Vice-President
H. A. HEGEMAN, Vice-Pres. and Treas. F. T. SARGENT, Secretary
W. C. PETERS, Manager Sales and Engineering

## National Railway Appliance Co.

Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., New York
Munsey Bldg., Washington, D. C. 100 Boylston St., Boston, Mass.
Hegeman-Castle Corporation, Railway Exchange Building, Chicago.

RAILWAY SUPPLIES

Tool Steel Gears and Pinions
Bell Locked Fare Box and Change Maker
The Aluminum Field Coils
Walter Tractor Snow Plows
Cutler-Hammer Electric Heaters
Pittsburgh Forge & Iron Co.'s Products
Genesco Paint Oils
E. Z. Car Control Corporation's Safety Devices
Garland Ventilators
Flaxlinum Insulation
Yellow Coach Mfg. Co.'s Single and Double Deck Busses
Economy Electric Devices Co.'s Power Saving and Inspection Meters
Anglo-American Varnish Co. Varnishes, Enamels, etc.
Gilmer Multiple Safety Step Treads
National Hand Holds
Ft. Pitt Spring & Mfg. Co., Springs
Turnstile Car Corporation's Turnstiles
Anderson Slack Adjusters
Feasible Drop Brake Staffs
Dunham Hopper Door Device

## BARBOUR-STOCKWELL CO.

205 Broadway, Cambridgeport, Mass.
Established 1858

Manufacturers of

Special Work for Street Railways

Frogs, Crossings, Switches and Mates
Turnouts and Cross Connections
Kerwin Portable Crossovers
Balkwill Articulated Cast Manganese Crossings

ESTIMATES PROMPTLY FURNISHED

## Lorain Special Trackwork Girder Rails

*Electrically Welded Joints*

THE LORAIN STEEL COMPANY
Johnstown, Pa.

*Sales Offices:*
Atlanta Chicago Philadelphia Cleveland Pittsburgh New York

*Pacific Coast Representative:*
United States Steel Products Company
Los Angeles Portland San Francisco Seattle

*Export Representative:*
United States Steel Products Company, New York, N. Y.

# 'CARNEGIE'

for

WHEELS
AXLES
RAILS
CROSS TIES



Carnegie Steel Company
PITTSBURGH, PENNA.

# THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

**Builders since 1868 of Water Tube Boilers of continuing reliability**

BRANCH OFFICES

BOSTON, 49 Federal Street
PHILADELPHIA, Packard Building
PITTSBURGH, Farmers Deposit Bank Building
CLEVELAND, Guardian Building
CHICAGO, Marquette Building
CINCINNATI, Traction Building
ATLANTA, Candler Building
PHOENIX, ARIZ., Heard Building
DALLAS, TEX., 2001 Magnolia Building
HONOLULU, H. T., Castle & Cooke Building
PORTLAND, ORE., 805 Gasco Building

WORKS

Bayonne, N. J.
Barberton, Ohio

**Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893**

BRANCH OFFICES

DETROIT, Ford Building
NEW ORLEANS, 521-5 Baronne Street
HOUSTON, TEXAS, Southern Pacific Building
DENVER, 435 Seventeenth Street
SALT LAKE CITY, 405-6 Kearns Building
SAN FRANCISCO, Sheldon Building
LOS ANGELES, 404-6 Central Building
SEATTLE, L. C. Smith Building
HAVANA, CUBA, Calle de Aguiar 104
SAN JUAN, PORTO RICO, Royal Bank Building

THE WORLD'S STANDARD

# "IRVINGTON"

Black and Yellow
Varnished Silk, Varnished Cambric, Varnished Paper

Irr-O-Slot Insulation Flexible Varnished Tubing
Insulating Varnishes and Compounds

**Irvington Varnish & Insulator Co.**
Irvington, N. J.

*Sales Representatives in the Principal Cities*

## OXYGEN, ACETYLENE, HYDROGEN

*for cutting, welding, etc.*

Quick shipment and low prices also on cylinders, valves, torches, regulators and supplies.

**INTERNATIONAL OXYGEN COMPANY**
Main Offices: Newark, N. J.
Branch Offices: New York Pittsburgh Toledo

## RAMAPO AJAX CORPORATION

Ramapo Automatic Return Switch Stands for Passing Sidings

RACOR

RACOR Tee Rail Special Work

Manganese Construction

GENERAL OFFICES: HILBURN, NEW YORK
Chicago New York Superior, Wis. Niagara Falls, N. Y.
Canadian Ramapo Iron Works, Ltd., Niagara Falls, Ont.

# ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.

Electrical Machinery, Steam Turbines, Steam Engines, Condensers, Gas and Oil Engines, Air Compressors, Air Brakes

## RAILWAY UTILITY COMPANY

CAR COMFORT WITH
**UTILITY**
HEATERS
REGULATORS
VENTILATORS

141-151 West 22d St. Chicago, Ill.
*Write for Catalogue*
1328 Broadway New York, N. Y.

FERALITE

## ALUMINO-THERMIC JOINTS

New and independent process. No inserts needed. Up-to-date and economical.

**Alumino-Thermic Corp., Roselle Park, N. J.**

## "Boyerized" Products Reduce Maintenance

Bemis Trucks
Case Hardened Brake Pins
Case Hardened Bushings
Case Hardened Nuts and Bolts
Manganese Brake Heads
Manganese Transom Plates
Manganese Body Bushings
Bronze Axle Bearings

Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.

**Bemis Car Truck Co., Springfield, Mass.**

## A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

**Cameron Electrical Mfg. Co., Ansonia, Connecticut**

## HORNE & EBLING CORPORATION

50 CHURCH ST., NEW YORK, N. Y.

HORNE

Brass Hardware For Cars and Buses

Motor and Controller Parts

Sterling Trolley Bases and Brakes

Mall. Iron and Brass Castings

# GALVANIZING

HOT DIP

We have the largest jobbing galvanizing plant and kettles in the United States. We guarantee our galvanizing to stand eight one minute dips in the Standard Copper Sulphate Solution Test. *Galvanized Products furnished.*

**JOSEPH P. CATTIE & BROTHERS**
Gaul and Letterly Sts., Philadelphia, Penna.

## NEW and RELAYING RAILS

1 TON OR 1000

TRACK EQUIPMENT

L. B. FOSTER CO.

RAIL ACCESSORIES

PITTSBURGH - PENNSYLVANIA

NEW YORK · JERSEY CITY · PHILADELPHIA · HAMILTON, O.

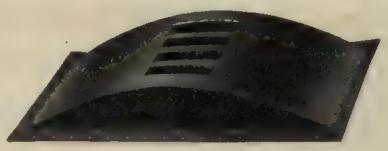
PERFECT
MICANITE
INSULATOR
Reg. U. S. Pat. Off.

ELECTRICAL INSULATION

Micanite armature and commutator insulation, commutator segments and rings, plate, tubes, etc., Empire oiled insulating materials; Linotape; Kablak; Mico; and other products—for the electrical insulating requirements of the railway.

*Catalogs will gladly be furnished*

MICA INSULATOR COMPANY
*Sole Manufacturers of Micanite*
*Established* 1893
68 Church St., New York 542 So. Dearborn St., Chicago
Works: Schenectady, N. Y.
8-F



N-L Type "AA"
Bus Ventilator

45 Out of 54!

On 45 of the 54 buses exhibited at the Atlantic City Convention N-L Ventilators were used. This shows what the foremost bus body builders think of N-L Ventilators.

Many leading street railways have standardized on them also.

It is no longer necessary to argue for the advantages of good ventilation. It is now universally recognized as a necessity for profitable car and bus service.

Write for a copy of *"Superior Ventilation."*

The Nichols-Lintern Company
7960 Lorain Ave. Cleveland, Ohio
Canadian Rep.: Railway & Power Eng. Corp., Ltd.,
133 Eastern Ave., Toronto, Ont.

N-L

PANELYTE
Electrical Insulation and Headlinings
THE PANELYTE COMPANY, Trenton, N. J.

SAMSON SPOT WATERPROOFED TROLLEY CORD

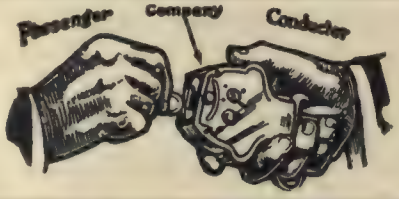


Trade Mark Reg. U. S. Pat. Off.
Made of extra quality stock firmly braided and smoothly finished. Carefully inspected and guaranteed free from flaws. Samples and information gladly sent.
SAMSON CORDAGE WORKS, BOSTON, MASS.

PS HEATERS
Car Heating and Ventilation
are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.
The Peter Smith Heater Company
6209 Hamilton Ave., Detroit, Mich.

PROVIDENCE FENDERS
H-B LIFE GUARDS
The Consolidated Car Fender Co., Providence, R. I.
Wendell & MacDuffie Co., 110 E. 42nd St., New York
General Sales Agents

Heywood-Wakefield
CAR SEATS
of pressed Steel for all Classes of Passenger Service. Rattan for covering seats and for snow sweepers.
HEYWOOD-WAKEFIELD CO.
Factory at Wakefield, Mass.
Offices at New York, Chicago, San Francisco
For detailed description — see — CAR BUILDERS CYCLOPEDIA 1922 Edition




Direct Automatic Registration By the Passengers
Rooke Automatic Register Co.
Providence, R. I.

THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



No. 478E
GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.



*Gets Every Fare*
PEREY TURNSTILES or PASSIMETERS
Use them in your Prepayment Areas and Street Cars
Perey Manufacturing Co., Inc.
101 Park Avenue, New York City




Type R-11
Double Register

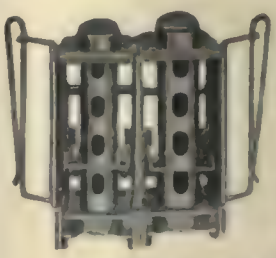
## International Registers

Made in single and double types to meet requirements of service. For hand or foot, mechanical or electric operation. Counters, car fittings, conductors' punches.

Exclusive selling agents for HEEREN ENAMEL BADGES.

**The International Register Co.**
15 South Throop Street, Chicago, Illinois

# JOHNSON Universal Changer



### Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

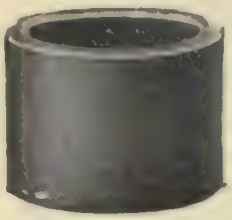
### Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

**JOHNSON FARE BOX COMPANY**
Ravenswood, Chicago, Ill.

## "Longwear" Pins and Bushings

*Hard—Accurate—Uniform*



Renewal Materials for Peckham and other Trucks

Castings—Forgings Springs

**E.G. Long Company**
50 Church Street, New York, N. Y.

TULC
A LUBRICANT

We make a specialty of

## ELECTRIC RAILWAY LUBRICATION

We solicit a test of TULC on your equipment

**The Universal Lubricating Co.**
Cleveland, Ohio
Tulc, Inc., Eastern Representative,
1617 Gotham National Bank Bldg., New York City

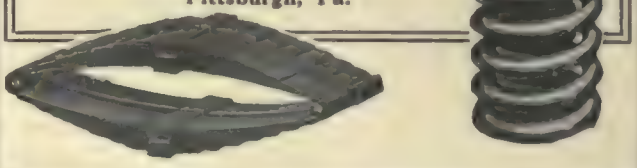
## Play for safety—

*plus resiliency—*
*plus long life*

*By specifying*

## FORT PITT SPRINGS

FORT PITT SPRING & MFG. CO.
Pittsburgh, Pa.



## The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



**THE STAR BRASS WORKS**
KALAMAZOO, MICH., U. S. A.

Let Us Tell You of Our Especially Designed Fare Box for the

## ONE MAN CAR

**THE CLEVELAND FARE BOX COMPANY**
Cleveland, Ohio
Canadian Cleveland Fare Box Co., Ltd., Preston, Ontario

For better Axles Specify

## "VALSCO"
## HEAT TREATED CAR AXLES
## LACLEDE STEEL CO.

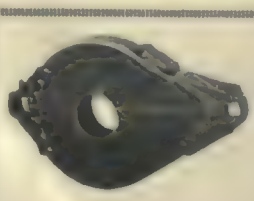
Arcade Bldg. St. Louis, Mo.

100 New Users in the Last Nine Months

## KASS SAFETY TREADS

HIGH
in efficiency and lasting qualities
LOW
in weight, initial and upkeep costs

**Morton Manufacturing Co., Chicago**



## CHILLINGWORTH

One-Piece Gear Cases
Seamless—Rivetless—Light Weight
Best for Service—Durability and Economy. *Write Us.*

**Chillingworth Mfg. Co.**
Jersey City, N. J.

## Griffin Wheel Company

410 North Michigan Ave.
Chicago, Ill.

# GRIFFIN F. C. S. WHEELS

## For Street and Interurban Railways

FOUNDRIES:

| | | |
|---|---|---|
| Chicago | Boston | St. Paul |
| Detroit | Kansas City | Los Angeles |
| Denver | Council Bluffs | Tacoma |



*"Differential Two-Car Train. Trailer dumping load clear of trench."*

## DIFFERENTIAL CARS

**Standard on Fifty Railways for**

| | |
|---|---|
| Track Maintenance | Track Construction |
| Ash Disposal | Hauling Crossties |
| Placing Ballast | Disposal of Waste |
| Coal Hauling | Snow Disposal |

Concrete Materials to the Job
Excavated Material to the Dump

*For Economy*

THE CLARK CONCRETE BREAKER
THE DIFFERENTIAL BOTTOM DUMP CAR
THE DIFFERENTIAL COMBINATION CAR-WHEEL TRUCK and TRACTOR

## THE DIFFERENTIAL STEEL CAR CO.

Findlay, Ohio, U. S. A.

# BRAKE SHOES

## AERA Standards Brake Heads



Diamond "S" Steel Back and Lug Shoes best for all equipment.

Manufactured and sold under U. S. Patent and Registered Trade Mark.

**American Brake Shoe and Foundry Co.**
**30 Church Street, New York**

332 So. Michigan Ave., Chicago

*You're having brush trouble*

CORRECT IT

USE LE CARBONE CARBON BRUSHES

*They talk for themselves*

COST MORE PER BRUSH
COST LESS PER CAR MILE

**W. J. Jeandron**
**345 Madison Avenue, New York**

Pittsburgh Office: 634 Wabash Bldg.
Chicago Office: 1657 Monadnock Block
San Francisco Office: 525 Market Street

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal and Toronto

Safety cars
make
safer dividends
when equipped with
"Tool Steel" gears & pinions

Tool Steel Quality

The Tool Steel
Gear and Pinion Co.
CINCINNATI, O.

BUY BRUSHES
MADE IN THE U. S. A.

USG

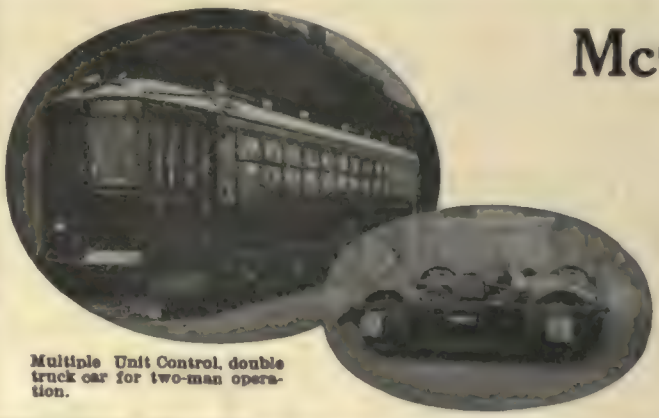
CARBON—GRAPHITE—METAL
MOTOR AND GENERATOR
BRUSHES

Meet every requirement

Grade recommendations, based upon your individual requirements and operating conditions, made by experienced Brush Engineers, guarantee long life and perfect service.

*Write for Catalog B-3.*

THE UNITED STATES GRAPHITE
COMPANY
SAGINAW, MICHIGAN, U. S. A.



Multiple Unit Control, double truck car for two-man operation.

McGUIRE-CUMMINGS
*Manufacturing Company*

General Offices
111 W. Monroe St., Chicago, Ill.

Street Cars, Trucks
Snow Sweepers

Traction Experts Sing the Praise
of THORNTON
Trolley Wheels



"Best I have ever seen for high speed cars," says the master-mechanic of the Cincinnati Traction Co. "Almost impossible to wear out," says an official of the Ohio Valley Electric Railway Co. and so it goes. They are built to outlast, outclass and outrun all other trolleys—and they are doing it.. An investigation will prove it.

Thornton Trolley Wheel Co.
Incorporated
Ashland, Kentucky



MORE-JONES
"TIGER" BRONZE
AXLE & ARMATURE
BEARINGS

Strong-tough-durable
anti-frictional
economical

MORE-JONES BRASS & METAL CO
ST. LOUIS MISSOURI

# SEARCHLIGHT SECTION

## USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD:

*Positions Wanted*, 4 cents a word, minimum 75 cents an insertion, payable in advance.

*Positions Vacant* and all other classifications, 8 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

*Box Numbers* in care of any of our offices count 10 words additional in undisplayed ads.

*Discount* of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 to 3 inches.....$4.50 an inch
4 to 7 inches..... 4.30 an inch
8 to 14 inches..... 4.10 an inch

Rates for larger spaces, or yearly rates, on request.

An *advertising inch* is measured vertically on one column, 3 columns—30 inches—to a page.

E.F.J.

## POSITIONS WANTED

AUDITOR, broad and thorough experience in financing and accounting; all branches railway, electric and gas utilities, open for engagement. Possess initiative and capable of assuming full control of all accounting matters. PW-758, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

EXECUTIVE, nine years manager of local street railway system in industrial town seeks larger opportunity. Thirteen years' prior experience in engineering, transportation and executive departments of large trunk line railroad. Has given special study to analyzing transportation problems and operating costs. PW-761, Electric Railway Journal, Real Estate Trust Bldg., Philadelphia, Pa.

EXECUTIVE—Twelve years' experience in engineering and operation, city and interurban; first-class record and references. PW-757, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

GENERAL superintendent of one of the largest electric railway systems, interurban and city, desires a change. Has come up through the ranks. Knows both electric railway and bus business. Capable of handling combination property. Highest references furnished confidentially. Open to any stable proposition. Wide experience with men in all departments of the business. If interested please give me an interview. Address PW-764, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

MR. MANAGER, are you in the field for a superintendent of equipment or master mechanic. If so you should realize that practical experience is an important factor in successful handling of this department. 15 years in the railway field, installation, maintenance and operation. PW-763, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa.

POSITION wanted by young man, thorough accountant, ten years' public utility experience middle west, six years as auditor, secretary and treasurer and assistant to manager; familiar with railway, bus, gas and electric departments. Now employed, but desire change. PW-766, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

TRAFFIC and transportation superintendent—Experienced interurban and city railway and bus operation, desire to connect with organization inaugurating bus service. PW-759, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

WANTED: Position with street railway company by master mechanic, 18 years' experience. Best of references. PW-765, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.


Rails!

In Small Lots As Well As Large

THERE is a class of rail buyers, occasionally in need of only small tonnages, who are paying a premium on their purchases elsewhere because they believe that we do not seek their patronage.

We maintain a large organization to give efficient service on small orders. Our tremendous volume gives us unequaled buying power and saves our clients money regardless of the tonnage required.

Immense stocks at strategic distributing points provide complete assortments near you. This adds a saving in freight to our already unbeatable prices.

Next time you need rails, let us know your requirements.

*We guarantee the same prompt, efficient service to all.*

HYMAN-MICHAELS COMPANY
*"The House of Dependable Service"*
122 South Michigan Avenue, Chicago

Dealers in New and Relaying Rails, Locomotives and Railway Equipment

*District Offices:* New York, Woolworth Bldg.; St. Louis, Railway Exchange Bldg.; Pittsburgh, First Nat'l Bank Bldg.; San Francisco, 234 Steuart St.
*Yards:* St. Louis, East Chicago, Ind., McKee's Rocks, Pa., San Francisco.
*Cable Address:* "Hymanmikel"
*World's Largest Distributors of Rails*

FOR SALE
Two Single Truck Snow Sweepers
Complete
Ready for operation
Splendid condition
Transit Equipment Co.
Cars — Motors
501 Fifth Avenue, New York

RAILS
New Relaying
1 TON = 1000
FROGS
SWITCHES
SPLICE BARS
BOLTS
NUTS
TIE PLATES
RAIL
BRACES
All Rails and Track Materials shipped subject to inspection and approval at destination.
L.B. Foster Co.
PITTSBURGH, PA
NEW YORK
L.B.F.C.

WANTED
Order for Oak, Car Stock, Cross Ties, Switch Ties, Timber. Have four mills in operation. A good stand of timber, grades guaranteed. Prices right. Let's get acquainted.
ENARC LUMBER MFG. CO.
411 Acuw Bldg., Little Rock, Ark.

WE WANT TO BUY
30—West. 306-C.V.-4
MOTORS
Have you any to offer?
ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

UNUSUAL 70 LB.
RAILS
ASCE Section—Low Price
ZELNICKER IN ST. LOUIS
Steel Piling—Cars—Track Material, Etc.

# WHAT AND WHERE TO BUY

**Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue**

**Advertising, Street Car**
Collier, Inc., Barron G.

**Air Receivers & Aftercoolers**
Ingersoll Rand Co.

**Anchors, Guy**
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

**Armature Shop Tools**
Elec. Service Supplies Co.

**Automatic Return Switch Stands**
Ramapo Ajax Corp.

**Automatic Safety Switch Stands**
Ramapo Ajax Corp.

**Axles**
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Johnson & Co., J. B.
Laclede Steel Co.
St. Louis Car Co.
Westinghouse E. & M. Co.

**Axles, Car Wheels**
Bethlehem Steel Co.

**Axles, Front & Rear, Motor Truck & Passenger Car**
Timken-Detroit Axle Co.

**Axles, Trailer & Motor Bus**
Timken-Detroit Axle Co.

**Badges and Buttons**
Elec. Service Supplies Co.
International Register Co., The

**Bearings and Bearing Metals**
Bemis Car Truck Co.
Brill Co., J. G., The
General Electric Co.
More-Jones Brass & Metal Co.
St. Louis Car Co.
Westinghouse E. & M. Co.

**Bearings, Center and Roller Side**
Stucki Co., A.

**Bells and Gongs**
Brill Co., The J. G.
Consolidated Car Heat. Co.
Elec. Service Supplies Co.
St. Louis Car Co.

**Bearings, Roller**
Norma-Hoffman Bearings Corp.

**Boilers**
Babcock & Wilcox Co.

**Bonding Apparatus**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Track-work Co.
Rail Welding & Bonding Co.

**Bonds, Rail**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co
Rail Welding & Bonding Co.
Westinghouse E. & M. Co.

**Book Publishers**
McGraw-Hill Book Co.

**Boxes, Switch**
Johns-Pratt Co.

**Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)**
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

**Brake Adjusters**
Brill Co., The J. G.
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.

**Brake Shoes**
Amer. Br. Shoe & Fdy. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.

**Brakes, Brake Systems and Brake Parts**
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
General Electric Co.
Horne & Ebling Corp.
National Brake Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.

**Brushes, Carbon**
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
U. S. Graphite Co.
Westinghouse E. & M. Co.

**Brushes Graphite**
U. S. Graphite Co.

**Brushes Wire Pneumatic**
Ingersoll-Rand Co.

**Buses, Motor**
Brill Co., The J. G.
International Motor Co.
St. Louis Car Co.

**Bushings, Case Hardened and Manganese**
Bemis Car Truck Co.
Brill Co., The J. G.
Long Co., E. G.
St. Louis Car Co.

**Cables. (See Wires and Cables)**

**Cambric Tapes, Yellow and Black Varnish**
Irvington Varnish & Ins. Co.
Mica Insulator Co

**Carbon Brushes (See Brushes, Carbon)**

**Cars, Dump**
Brill Co., J. G., The
Differential Steel Car Co.
St. Louis Car Co.

**Car Lighting Fixtures**
Elec. Service Supplies Co.

**Car Panel Safety Switches**
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.

**Cars, Passenger, Freight, Express, etc.**
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg Co
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

**Cars, Gas, Rail**
Brill Co., J. G., The
St. Louis Car Co.

**Cars, Second Hand**
Electric Equipment Co.
Transit Equipment Co.

**Cars, Self-Propelled**
Brill Co., J. G., The
General Electric Co.

**Car Wheels, Rolled Steel**
Bethlehem Steel Co

**Castings, Brass, Composition or Copper**
Anderson Mfg. Co., A. & J. M.
More-Jones Brass & Metal Co.

**Castings, Gray Iron and Steel**
Bemis Car Truck Co.
Fort Pitt Steel Castings Co.
St. Louis Car Co.

**Castings, Malleable and Brass**
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Fort Pitt Steel Castings Co.
Horne & Ebling Corp.
St. Louis Car Co.

**Catchers and Retrievers, Trolley**
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

**Catenary Construction**
Archbold-Brady Co.

**Ceilings, Plywood, Panels**
Haskelite Mfg. Co.

**Chains, Parlor Car**
Heywood-Wakefield Co.

**Change Carriers**
Cleveland Fare Box Co.

**Circuit-Breakers**
Anderson, A. & J. M. Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Clamps and Connectors for Wires and Cables**
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co
Westinghouse E. & M. Co.

**Cleaners and Scrapers Track (See also Snow-Plows, Sweepers and Brooms)**
Brill Co., The J. G.
St. Louis Car Co.

**Clusters and Sockets**
General Electric Co.

**Coal and Ash Handling (See Conveying and Hoisting Machinery)**

**Coil Banding and Winding Machines**
Elec. Service Supplies Co.

**Coils Armature and Field**
General Electric Co.
Westinghouse E. & M. Co.

**Coils, Choke and Kicking**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

**Coin Counting Machines**
Cleveland Fare Box Co.
Intern'l Register Co.
Johnson Fare Box Co.

**Coin Sorting Machines**
Cleveland Fare Box Co.

**Coin Wrappers**
Cleveland Fare Box Co.

**Commutator Slotters**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co

**Commutator Truing Devices**
General Electric Co.

**Commutators or Parts**
Cameron Elec'l Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Compressors, Air**
Allis-Chalmers Mfg. Co.
General Electric Co
Ingersoll Rand Co.
Westinghouse Tr. Br. Co.

**Concrete Reinforcing Bars**
Laclede Steel Co.

**Condensor Papers**
Irvington Varnish & Ins. Co

**Condensers**
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll Rand Co.
Westinghouse E. & M. Co.

**Connectors, Solderless**
Frankel Connector Co.
Westinghouse E. & M. Co.

**Connectors, Trailer Car**
Consolidated Car Heat. Co.
Elec. Service Supplies Co.
Ohio Brass Co.

**Controllers or Parts**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Controller Regulators**
Elec. Service Supplies Co.

**Controlling Systems**
General Electric Co.
Westinghouse E. & M. Co.

**Converters, Rotary**
Allis-Chalmers Mfg. Co.
General Electric Co
Westinghouse E. & M. Co.

**Copper Wire**
Anaconda Copper Mining Co.

**Cord, Bell, Trolley, Register**
Brill Co., The J. G.
Elec. Service Supplies Co.
Internat'l Register Co., The
Roebling's Sons Co., John A.
St. Louis Car Co.
Samson Cordage Works

**Cord Connectors and Couplers**
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

**Couplers Car**
Brill Co., The J. G.
Ohio Brass Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.

**Cross Arms (See Brackets)**

**Crossing Foundations**
International Steel Tie Co

**Crossing, Frog & Switch**
Ramapo Ajax Corp.

**Crossing, Manganese**
Bethlehem Steel Co.
Ramapo Ajax Corp.

**Crossings**
Ramapo Ajax Corp.

**Crossings, Track (See Track, Special Work)**

**Crossings, Trolley**
Ohio Brass Co.

**Curtains & Curtain Fixtures**
Brill Co., The J. G.
Elec. Service Supplies Co.
Morton Mfg. Co.
St. Louis Car Co.

**Dealer's Machinery**
Elec. Equipment Co.
Hyman-Michaels Co.
Transit Equipment Co.

**Derailing Devices (See also Track Work)**

**Derailing Switches**
Ramapo Ajax Corp.

**Destination Signs**
Elec. Service Supplies Co.

**Detective Service**
Wish Service, P. Edward

**Door Operating Devices**
Brill Co., The J. G.
Consolidated Car Heat. Co.
General Electric Co.
Nat'l Pneumatic Co., Inc.
St. Louis Car Co.

**Doors & Door Fixtures**
Brill Co., The J. G.
Consolidated Car Heat. Co
General Electric Co.
Morton Mfg. Co.

**Doors, Folding Vestibule**
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.

**Drills, Track**
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ingersoll Rand Co.
Ohio Brass Co.

**Dryers, Sand**
Elec. Service Supplies Co

**Ears**
Ohio Brass Co.

**Electrical Wires and Cables**
Amer. Electrical Works
Amer. Steel & Wire Co.
Roebling's Sons & Co., J. A.

**Electric Grinders**
Railway Track-work Co.
Western Electric Co

**Electrodes, Carbon**
Railway Track-work Co.
Rail Welding & Bonding Co.

**Electrodes, Steel**
Railway Track-work Co
Rail Welding & Bonding Co.

**Engines Gas, Oil or Steam**
Ingersoll Rand Co

**Engineers, Consulting, Contracting and Operating**
Allison & Co., J. S.
Archbold-Brady Co.
Beeler, John A.
Buchanan & Layng Corp.
Bureau of Commercial Economics, Inc.
Bylleshy & Co., H. M.
Day & Zimmerman, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Ong, Joe R.
Railway Audit & Inspection Co.
Richey, Albert S.
Robinson & Co., Dwight P.
Sanderson & Porter
Stevens & Wood
Stone & Webster
White Eng. Corp., The J. G.

**Engineering Equipment Engineering Co.**

**Engines, Gas, Oil or Steam**
Allis-Chalmers Mfg. Co.
Westinghouse E. & M. Co.

**Fare Boxes**
Cleveland Fare Box Co
Johnson Fare Box Co.
Nat'l Ry Appliance Co
Ohmer Fare Register Co

**Fare Registers**
Ohmer Fare Register Co.

**Fences, Woven Wire and Fence Posts**
Acme Wire Co
Amer. Steel & Wire Co.

**Fenders and Wheel Guards**
Brill Co., The J. G.
Consolidated Car Fender Co
Elec. Service Supplies Co.
St. Louis Car Co.

**Fibre and Fibre Tubing**
Westinghouse E. & M. Co

**Field Coils (See Coils)**

**Floodlights**
Elec. Service Supplies Co.

**Forgings**
Brill Co., J. G., The

**Frogs & Crossings, Tee Rail**
Bethlehem Steel Co.
Ramapo Ajax Corp.

**Frogs, Track (See Track Work)**

**Frogs, Trolley**
Ohio Brass Co.

**Fuses and Fuse Boxes**
Consolidated Car Heat. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Fuses, Cartridge, Non-Refillable & High Voltage**
Johns-Pratt Co.

**Fuses, Refillable**
General Electric Co.
Johns-Manville, Inc.
Johns-Pratt Co.

**Galvanizers, Hot Dip**
Jos. P. Cattie & Bros.

**Gaskets**
Westinghouse Tr. Br. Co.

**Gas Producers**
Westinghouse E. & M. Co.

**Gas-Electric Cars**
General Elec. Co.
Westinghouse E. & M. Co.

**Gates, Car**
Brill Co., The J. G.
St. Louis Car Co.

**Gear Blanks**
Bethlehem Steel Co.
Brill Co., J. G., The

**Gear Cases**
Chillingworth Mfg. Co.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

**Gears and Pinions**
Bemis Car Truck Co.
Bethlehem Steel Co.
Elec. Service Supplies Co.
General Electric Co
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

**Generating Sets, Gas-Electric**
General Electric Co.

**Generators**
Allis-Chalmers Mfg Co.
General Electric Co.
Westinghouse E. & M. Co.

**Girder Rails**
Bethlehem Steel Co.
Lorain Steel Co.

**Gong (See Bells and Gongs)**

**Greases (See Lubricants)**

**Grinders and Grind Supplies**
Indianapolis Switch & Frog Co
Railway Track-work Co.

**Grinders, Portable**
Railway Track-work Co.

**Grinders, Portable Electric**
Railway Track-work Co.

**Grinding Bricks and Wheels**
Railway Track-work Co.

**Guard Rail Clamps**
Ramapo Ajax Corp.

**Guard Rails, Tee Rail & Manganese**
Ramapo Ajax Corp.

**Guards, Trolley**
Elec. Service Supplies Co
Ohio Brass Co.

**Hammers, Pneumatic**
Ingersoll Rand Co.

**Harps, Trolley**
Elec. Service Supplies Co.
More-Jones Brass Metal Co.
Nuttall Co., R. D.
Star Brass Works
Thornton Trolley Wheel Co

**Headlights**
Elec. Service Supplies Co
General Eelctric Co.
Ohio Brass Co.
St. Louis Car Co.

**Headlining**
Haskelite Mfg. Co.
Panelyte Co.

**Heaters, Car (Electric)**
Consolidated Car Heat Co
Gold Car Heat. & Ltg. Co
Nat'l Ry. Appliance Co
Smith Heater Co., Peter

**Heaters, Car, Hot Air and Water**
Elec. Service Supplies Co
Smith Heater Co., Peter

**Helmets—Welding**
Railway Track-work Co.
Rail Welding & Bonding Co.

**Hoists, Portable**
Ingersoll Rand Co.

**Hydraulic Machinery**
Allis-Chalmers Mfg Co.

**Instruments Measuring, Testing and Recording**
Elec. Service Supplies Co.
General Electric Co.
Johns-Pratt Co.
Westinghouse E. & M. Co.



*A four-tool pneumatic tamping gang at work on a track repair job*

# Pneumatic Tie Tamping

## *The most efficient and economical way to tamp track*

Ingersoll-Rand Pneumatic Tie Tampers speed-up track tamping. Four men with these machines will tamp more track and do a much better job than twelve to sixteen men working with hand picks and bars. And the track stands up two to three times longer than when tamped by hand.

Ingersoll-Rand Portable Air Compressors, for tie tamping service, makes possible other savings through the use of air operated Paving Breakers, Rail Drills, Woodborers, Spike Drivers, Grinders, etc. Ask for complete information on the uses and savings of these portable compressors — the tamping outfits.

INGERSOLL-RAND COMPANY-11 BROADWAY, NEW YORK CITY.

*Offices in principal cities the world over*

FOR CANADA REFER-CANADIAN INGERSOLL-RAND CO. LIMITED, 260 ST. JAMES STREET, MONTREAL, QUEBEC.

# Ingersoll-Rand

**Insulating Cloth, Paper and Tape**
General Electric Co.
Irvington Varnish & Ins. Co.
Mica Insulator Co.
Mitchell-Rand Mfg. Co.
Okonite Co.
Stand. Underground Cable Co.
Westinghouse E. & M. Co.

**Insulating, Silk & Varnish**
Irvington Varnish & Ins Co.

**Insulation (See also Paints)**
Electric Ry. Equipment Co.
Elec. Service Suplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Mica Insulator Co.
Mitchell-Rand Mfg. Co.
Okonite Co.
Westinghouse E. & M. Co.

**Insulation Slots**
Irvington Varnish & Ins. Co.

**Insulators (See also Line Materials)**
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse E. & M. Co.

**Insulator Pins**
Elec. Service Supplies Co.
Hubbard & Co.

**Jacks (See also Cranes, Hoists and Lifts)**
Elec. Service Supplies Co.

**Joints, Rail**
(See Rail Joints)

**Journal Boxes**
Bemis Car Truck Co.
Brill Co., J. G.
Fort Pitt Steel Castings Co.
St. Louis Car Co.

**Junction Boxes**
Std. Underground Cable Co.

**Lamps, Guards and Fixtures**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

**Lamps, Arc & Incandescent (See also Headlights)**
General Electric Co.
Westinghouse E. & M. Co.

**Lamps, Signal and Marker**
Nichols-Lintern Co.
Ohio Brass Co.

**Lanterns, Classification**
Nichols-Lintern Co.

**Lightning Protection**
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Shaw, Henry M.
Westinghouse E. & M. Co.

**Line Material (See also Brackets, Insulators, Wires, etc.)**
Archbold-Brady Co.
Electric Ry. Equipment Co.
Elec. Service Sup. Co.
General Electric Co.
Hubbard & Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

**Locomotives, Electric**
General Electric Co.
McGuire-Cummings Mfg. Co
St. Louis Car Co.
Westinghouse E. & M. Co.

**Locomotive Oil Engine, Electric Driver**
Ingersoll Rand Co.

**Lubricating Engineers**
Galena Signal Oil Co.
Universal Lubricating Co

**Lubricants, Oil and Grease**
Galena Signal Co.
Universal Lubricating Co.

**Manganese Parts**
Bemis Car Truck Co.

**Manganese Steel Castings**
Wm. Wharton Jr. & Co.

**Manganese Steel Guards Rails**
Ramapo Ajax Corp.

**Manganese Steel, Special Track Work**
Bethlehem Steel Co.

**Manganese Steel Switches Frogs & Crossings**
Bethlehem Steel Co.
Ramapo Ajax Corp.

**Meters (See Instruments)**

**Mica**
Mica Insulator Co.

**Molding, Metal**
Allis-Chalmers Mfg. Co.

**Motor Buses (See Buses, Motor)**

**Motors, Electric**
Allis-Chalmers Mfg. Co.
Westinghouse E. & M. Co.

**Motors and Generators, Sets**
Allis-Chalmers Mfg. Co.
General Electric Co.

**Motormen's Seats**
Brill Co., J. G.
Elec. Service Sup. Co.
Heywood-Wakefield Co.
St. Louis Car Co.
Wood Co., Chas. N.

**Nuts and Bolts**
Barbour-Stockwell Co.
Bemis Car Truck Co.
Bethlehem Steel Co.
Hubbard & Co.

**Oils (See Lubricants),**

**Omnibuses (See Buses, Motor)**

**Oxygen**
International Oxygen Co.

**Oxy-Acetylene (See Cutting Apparatus, Oxy-Acetylene)**

**Packing**
Elec. Service Suplies Co.
Westinghouse E. & M. Co.

**Paints and Varnishes (Insulating)**
Irvington Varnish & Ins. Co.
Mitchell-Rand Mfg. Co.

**Paints and Varnishes for Woodwork**
National Ry. Appliance Co

**Pavement Breakers**
Ingersoll Rand Co.

**Paving Material**
Amer. Br. Shoe & Fdy. Co.

**Pickup, Trolley Wire**
Elec. Service Supplies Co.
Ohio Brass Co.

**Pinion Pullers**
Elec. Service Supplies Co
General Electric Co.
Wood Co., Chas. N.

**Pinions (See Gears)**

**Pins, Case Hardened, Wood and Iron**
Bemis Car Truck Co.
Elec. Service Sup. Co.
Ohio Brass Co.
Westinghouse Tr. Brake Co.

**Pipe Fittings**
Westinghouse Tr. Brake Co.

**Planers (See Machine Tools)**

**Plates for Tee Rail Switches**
Ramapo Ajax Corp.

**Pliers, Rubber Insulated**
Elec. Service Sup. Co.

**Pneumatic Tools**
Ingersoll Rand Co.

**Pole Line Hardware**
Bethlehem Steel Co.
Ohio Brass Co.

**Poles, Metal Street**
Elec. Ry. Equipment Co.
Hubbard & Co.

**Pole Reinforcing**
Hubbard & Co.

**Poles & Ties Treated**
Bell Lumber Co.

**Poles, Ties, Posts, Piling & Lumber**
Bell Lumber Co.
Southern Cypress Mfgr's Assn.

**Poles, Trolley**
Bell Lumber Co.
Elec. Service Supplies Co.
Nuttall Co., R. D.

**Poles, Tubular Steel**
Elec. Ry. Equipment Co.
Elec. Service Sup. Co.

**Potheads**
Okonite Co.

**Power Saving Devices**
National Ry. Appliance Co
Railway Improvement Co.

**Pressure Regulators**
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

**Pumps**
Allis-Chalmers Mfg. Co.
Ingersoll Rand Co.

**Pumps Vacuum**
Ingersoll Rand Co.

**Punches, Ticket**
Intern'l Register Co., The
Wood Co., Chas. N.

**Rail Braces & Fastenings**
Ramapo Ajax Corp

**Rail Grinders (See Grinders)**

**Rail Filler**
Philip Carey Co.

**Rail Joints**
Carnegie Steel Co.

**Rail Joints—Welded**
Lorain Steel Co.

**Rails, Relaying**
Foster Co., L. B.
Hyman-Michaels Co.

**Rails, Steel**
Bethlehem Steel Co.
Carnegie Steel Co.
Foster Co., L. B.

**Railway Paving Guards, Steel**
Godwin Co., Inc., W. S.

**Railway Safety Switches**
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.

**Rail Welding**
Railway Track-work Co.
Rail Welding & Bonding

**Rattan**
Brill Co., The J. G.
Elec. Service Supplies Co.
Heywood-Wakefield Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

**Registers and Fittings**
Brill Co., The J. G.
Elec. Service Supplies Co.
Intern'l Register Co., The
Ohmer Fare Register Co.
Rooke Automatic Register Co.
St. Louis Car Co.

**Reinforcement, Concrete**
Amer. Steel & Wire Co.

**Repair Shop Appliances (See also Coil Banding and Winding Machines)**
Elec. Service Supplies Co

**Repair Work (See also Coils)**
General Electric Co.
Westinghouse E. & M. Co.

**Replacers, Car**
Elec. Service Sup. Co.

**Resistances**
Consolidated Car Heat. Co.

**Resistance, Wire and Tube**
General Electric Co.
Westinghouse E. & M. Co.

**Retrievers, Trolley (See Catchers and Retrievers, Trolley)**

**Rheostats**
General Electric Co.
Westinghouse E. & M. Co.

**Roofing Car**
Pantasote Co., Inc.

**Roofs**
Haskelite Mfg. Co.

**Sanders, Track**
Brill Co., The J. G.
Elec. Service Sup. Co.
Horne & Ebling Corp.
Nichols-Lintern Co.
Ohio Brass Co.
St. Louis Car Co.

**Sash Fixtures, Car**
Brill Co., The J. G.
St. Louis Car Co.

**Scrapers, Track (See Cleaners and Scrapers, Track)**

**Screw Drivers, Rubber Insulated**
Elec. Service Sup. Co.

**Seats, Bus**
Brill Co., J. G., The
Heywood-Wakefield Co.
St. Louis Car Co.

**Seats, Car (See also Rattan)**
Brill Co. The J. G.
Heywood-Wakefield Co.
St. Louis Car Co.

**Seating Materials**
Brill Co., J. G.
Heywood-Wakefield Co.
Pantasote Co., Inc.
St. Louis Car Co.

**Second Hand Equipment**
Electric Equipment Co.
Hyman-Michaels Co.
Transit Equipment Co.

**Shades, Vestibule**
Brill Co., The J. G.

**Shovels**
Brill Co., The J. G.
Hubbard & Co.

**Side Bearings (See Bearings, Center and Side)**

**Signals, Car Starting**
Consolidated Car Heat Co
Elec. Service Sup. Co.
Nat'l Pneumatic Co., Inc.

**Signals, Indicating**
Nichols-Lintern Co.

**Signal Systems, Highway Crossing**
Nachod Signal Co., Inc.
Wood Co., Chas. N.

**Signal Systems, Block**
Elec. Service Sup. Co.
Nachod Signal Co., Inc.

**Slack Adjusters (See Brake Adjusters)**

**Sleet Wheels and Cutters**
Anderson Mfg. Co., A. & J. M.
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.

**Smokestacks, Car**
Nichols-Lintern Co.

**Sockets & Receptacles**
National Metal Molding Co

**Snow Sweepers, Rattan**
Heywood-Wakefield Co

**Snow-Plows, Sweepers and Brooms**
Brill Co., The J. G.
Consolidated Car Fender Co
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

**Soldering and Brazing Apparatus (See Welding Processes and Apparatus)**
Irvington Varnish & Ins Co.

**Solderless, Connector**
Frankel Connector Co

**Special Adhesive Papers**
Irvington Varnish & Ins. Co

**Special Trackwork**
Bethlehem Steel Co.
Lorain Steel Co.

**Spikes**
Amer. Steel & Wire Co.

**Splicing Compounds**
Westinghouse E. & M. Co.

**Splicing Sleeves (See Clamps and Connectors)**

**Springs, Car and Truck**
Amer. Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Fort Pitt Spring & Mfg. Co.
St. Louis Car Co.

**Sprinklers, Track and Road**
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

**Steel and Steel Products**
Carnegie Steel Co.

**Steps, Car**
Brill Co., J. G., The
Morton Mfg. Co.

**Stokers, Mechanical**
Babcock & Wilcox Co.
Westinghouse E. & M. Co.

**Stop Signals**
Nichols-Lintern Co.

**Storage Batteries (See Batteries, Storage)**

**Strain, Insulators**
Anderson, A. & J. M. Mfg. Co.
Ohio Brass Co.

**Strand**
Roebling's Sons Co., J. A.

**Straps, Car, Sanitary**
Railway Improvement Co.

**Subway Boxes**
Johns-Pratt Co.

**Superheaters**
Babcock & Wilcox Co.

**Sweepers, Snow (See Snow Plows, Sweepers and Brooms)**

**Switches, Safety**
Johns-Pratt Co.

**Switches, Selector**
Nichols-Lintern Co.

**Switches, Tee Rail**
Ramapo Ajax Corp.

**Switches, Track (See Track Special Work)**

**Switches and Switchboards**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

**Tamper Tie**
Ingersoll-Rand Co.
Railway Track-work Co.

**Tapes and Cloths (See Insulating Cloth, Paper and Tape)**

**Tee Rail Special Track Work**
Bethlehem Steel Co.
Ramapo Ajax Corp.

**Telephones and Parts**
Elec. Service Supplies Co.

**Terminals, Cable**
Std. Underground Cable Co

**Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)**

**Thermostats**
Consolidated Car Heat. Co.
Grand Car Heat & Ltg Co
Railway Utility Co
Smith Heater Co., Peter

**Ticket Choppers & Destroyers**
Elec. Service Supplies Co

**Ties, Mechanical**
Dayton Mechanical Tie Co.

**Ties and Tie Rods, Steel**
Barbour-Stockwell Co.
Carnegie Steel Co.
International Steel Tie Co

**Ties, Wood Cross (See Poles, Ties, Posts, etc.)**

**Tool Steel**
Bethlehem Steel Co.

**Tools, Track & Miscellaneous**
Amer. Steel & Wire Co.
Elec. Service Supplies Co
Hubbard & Co.
Railway Track-work Co.

**Torches, Acetylene (See Cutting Apparatus)**

**Towers and Transmission Structures**
Archbold-Brady Co.
Westinghouse E. & M. Co

**Track Grinders**
Railway Track-work Co.

**Trackless Trolley Cars**
Brill Co., J. G. The
St. Louis Car Co.

**Track, Special Work**
Barbour-Stockwell Co.
Bethlehem Steel Co.
Ramapo Ajax Corp

**Transfer (See Tickets)**

**Transfer Issuing Machines**
Ohmer Fare Register Co

**Transfer Tables**
American Bridge Co.

**Transformers**
Allis-Chalmers Mfg. Co
General Electric Co.
Westinghouse E. & M. Co.

**Treads, Safety, Stair, Car Step**
Morton Mfg. Co.

**Trolley Bases**
Elec. Service Supplies Co.
General Electric Co.
More-Jones Brass & Metal Co
Nuttall Co., R. D.
Ohio Brass Co.

**Trolley Bases, Retrieving**
Elec. Service Supplies Co.
Nuttall Co., R. D.
Ohio Brass Co.

**Trolley Buses**
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.

**Trolley Material, Overhead**
Anderson, A. & J. M. Mfg Co.
Elec. Service Supplies Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.

**Trolley Wheel Bushings**
More-Jones Brass & Metal Co.

**Trolley Wheels & Harps**
More-Jones Brass & Metal Co.
Thornton Trolley Wheel Co.

**Trolley Wheels (See Wheels, Trolley)**

**Trolley Wire**
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Roebling's Sons Co., J. A.

**Trucks, Car**
Bemis Car Truck Co.
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
Taylor Elec. Truck Co.

**Tubing, Yellow & Black Flexible Varnish**
Irvington Varnish & Ins. Co.

**Turbines, Steam**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

**Turbines, Water**
Allis-Chalmers Mfg. Co.

**Turnstiles**
Elec. Service Supplies Co.
Perey Mfg. Co., Inc.

**Valves**
Ohio Brass Co.
Westinghouse Tr. Br. Co.

**Varnished Papers & Silks**
Acme Wire Co.
Irvington Varnish & Ins. Co.

**Ventilators, Car**
Brill Co., The J. G.
Nat'l Ry Appliance Co.
Nichols-Lintern Co.
Railway Utility Co.
St. Louis Car Co.

**Welded Rail Joints**
Alumino-Thermic Corp.
Ohio Brass Co
Railway Track-work Co
Rail Welding & Bonding Co.

**Welders, Portable Electric**
Ohio Brass Co.
Railway Track-work Co
Rail Welding & Bonding Co.

**Welding & Cutting Tools**
International Oxygen Co.

**Welding Processes and Apparatus**
Alumino-Thermic Corp.
General Electric Co.
International Oxygen Co
Ohio Brass Co.
Railway Track-work Co.
Rail Welding & Bonding Co.
Westinghouse E. & M. Co.

**Welding Steel**
Railway Track-work Co.
Rail Welding & Bonding Co

**Wheel Guards (See Fenders and Wheel Guards)**

**Wheel Presses (See Machine Tools)**

**Wheels, Car, Cast Iron**
Bemis Car Truck Co.
Carnegie Steel Co.
Griffin Wheel Co

**Wheels, Wrought Steel**
Carnegie Steel Co.

**Wheels, Trolley**
Elec. Ry Equipment Co
Elec. Service Supplies Co
General Electric Co
More-Jones Brass & Metal Co
Nuttall Co., R. D
Star Brass Works.

**Whistles, Air**
General Electric Co.
Ohio Brass Co
Westinghouse E. & M. Co.

**Wire Rope**
Roebling's Sons Co., J. A.

**Wires and Cables**
Acme Wire Co.
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min Co
General Electric Co.
Okonite Co.
Roebling's Sons Co J A
Westinghouse E & M Co
Std. Underground Cable Co.



Carey Elastite Rail Filler is made to fit any rail section.

Omaha and Council Bluffs Street Railway Bridge, Omaha, Neb.

Gilbert Ave., Viaduct, Cincinnati, Ohio

# Make the track as watertight as the bridge-deck!

**Engineers take every precaution to waterproof bridges and viaducts, yet there has always been a vulnerable point between the track and the bridge paving through which water and frost might enter, resulting in the weakening of the structure and concrete staining.**

**But now car-tracks can be made just as water-tight as the bridge-decking. On the Omaha and Council Bluffs street railway bridge over the Missouri at Omaha, Nebraska, and the Gilbert Avenue viaduct at Cincinnati, Ohio, Carey Elastite Rail Filler makes a water-tight and frost-tight seal between the rail and the paving. It protects the bridge, absorbs vibration, dissipates traffic-impact, prevents paving-disintegration, and reduces traffic-noise.**

THE PHILIP CAREY COMPANY
53 Wayne Ave., Lockland, Cincinnati, Ohio

### Elastite Rail Filler

is easy to install. A tap of a mallet sets it in the web of the rail. Carey Elastite Rail Filler is a composition of specially-tempered asphalt and fibre which is used as a resilient cushion between the rail and the pavement, absorbing traffic-impact, rail-vibration, and traffic-noise. It is preformed to fit any rail-section and is readily shaped on the job to fit any track-curve. It is unaffected by moisture or temperature changes and is enduring under all service conditions.

Carey Elastite
REG. U.S. PATENT OFFICE

# RAIL FILLER

# ALPHABETICAL INDEX TO ADVERTISEMENTS


Page

A

Acme Wire Co. . . . . 29
Allison Co., J. E. . . . . 21
Allis-Chalmers Mfg.Co. . . . . 30
Alumino-Thermic Corp. . . . . 30
Amer. Brake Shoe & Fdy. Co. . . 33
American Car Co. . . . . 41
American Electrical Works. . . . 28
American Steel Foundries . . . . 16
American Steel & Wire Co. . . . . 29
Anaconda Copper Milling Co. . . 28
Anderson Mfg. Co., A. & J. M. . 28
Archbold-Brady Co. . . . . 21

B

Babcock & Wilcox Co. . . . . 30
Barbour-Stockwell Co. . . . . 29
Beeler Organization . . . . . 20
Bell Lumber Co. . . . . 40
Bemis Car Truck Co. . . . . 30
Bethlehem Steel Co. . . . . 14
Brill Co., The J. G. . . . . 41
Buchanan & Layng Corp. . . . . 21
Bureau of Comm. Economics, Inc. . . . . 21
Byllesby & Co., H. M. . . . . 20

C

Cameron Electrical Mfg. Co. . . . 30
Carey, Philip Co. . . . . 39
Carnegie Steel Co. . . . . 29
Cattie & Bros., Jos. P. . . . . 30
Chillingworth Mfg. Co. . . . . 32
Cleveland Fare Box Co. . . . . 32
Collier, Inc., Barron G. . . . . 22
Consolidated Car Fender Co. . . . 31
Consolidated Car Heating Co. . . 15

D

Day & Zimmermann, Inc. . . . . 20
Dayton Mech. Tie Co. . . . . 26
Differential Steel Car Co., The . 33

Page

E

Electric Equipment Co. . . . . 35
Electric Ry Equipment Co. . . . 28
Electric Service Supplies Co. . . 9

F

"For Sale" Ads. . . . . 35
Ford, Bacon & Davis . . . . . 20
Fort Pitt Spring & Mfg. Co. . . 32
Foster Co., Inc., L. B. . . . . 30

G

Galena Signal Oil Co . . . . . 17
General Electric Co. 18, Back Cover
Gold Car Heating & Ltg. Co. . . 31
Griffin Wheel Co. . . . . 33

H

Hale-Kilburn Co. . . . . 26
Haskelite Mfg. Co. . . . . 21
Help Wanted Ads . . . . . 35
Hemphill & Wells . . . . . 20
Heywood-Wakefield Co . . . . 31
Holst, Englehard W. . . . . 20
Horne & Ebling . . . . . 30
Hubbard & Co. . . . . 28
Hyman-Michaels Co. . . . . 35

I

Ingersoll-Rand Co. . . . . 37
International Motor Co. . . . . 12-13
International Oxygen Co. . . . . 30
International Register Co., The. 32
International Steel Tie Co., The. 7
Irvington Varnish & Insulator Co. 30

J

Jackson, Walter . . . . . 20
Jeandron W. J. . . . . 33
Johns-Pratt Co. . . . . 28
Johnson & Co., Inc., J. R. . . . . 40
Johnson Fare Box Co. . . . . 32

Page

K

Kuhlman Car Co . . . . . 41

L

Laclede Steel Co. . . . . 32
Le Carbone Co. . . . . 33
Long, E. J. . . . . 32
Lorain Steel Co. . . . . 29

M

McGraw-Hill Book Co., Inc. . . . 35
McGuire-Cummings Mfg. Co. . . . 34
Mica Insulator Co. . . . . 31
Mitchell Rand Mfg. Co. . . . . 8
Moore-Jones Brass & Metal Co. . 34
Morton Mfg. Co. . . . . 32

N

Nachod Signal Co. . . . . 28
National Brake Co. . . . . 19
National Pneumatic Co., Inc. . . 11
National Ry. Appliance Co. . . . 29
Nichols-Lintern Co. . . . . 31
Nuttall Co., R. D. . . . . 25

O

Ohio Brass Co. . . . . 5
Ohmer Fare Register Co. . . . . 27
Okonite Co., The . . . . . 28
Ong, Joe R. . . . . 29

P

Panelyte Co. . . . . 31
Perey Mfg. Co., Inc. . . . . 31
Positions Wanted and Vacant. . . 35

R

Railway Audit & Inspection Co. . 21
Railway Track-work Co. . . . . 4
Railway Utility Co. . . . . 30
Rail Welding & Bonding Co. . . . 10
Ramapo Ajax Corp. . . . . 30

Page

R

Richey, Albert S. . . . . 29
Robinson Co., Dwight P. . . . . 29
Roebling's Sons Co., John A. . . 28
Rooke Automatic Register Co. . . 31

S

St. Louis Car Co. . . . . 27
Samson Cordage Works. . . . . 31
Sanderson & Porter . . . . . 29
Searchlight Section . . . . . 35
Shaw, Henry M. . . . . 28
Smith Heater Co., Peter. . . . . 31
Southern Cypress Mfrs. Assn. . . 24
Standard Underground Cable Co. . 28
Star Brass Works . . . . . 32
Stevens & Wood, Inc. . . . . 29
Stone & Webster . . . . . 29
Stucki Co., A. . . . . 40

T

Thornton Trolley Wheel Co. . . . 34
Timken Detroit Axle Co. . . . . 23
Tool Steel Gear & Pinion Co. . . 34
Transit Equipment Co. . . . . 35

U

Universal Lubricating Co. . . . 32
U. S. Graphite Co. . . . . 32

W

Want Ads . . . . . 35
Wason Mfg. Co. . . . . 41
Westinghouse Elec. & Mfg. Co. . 2
Westinghouse Traction Brake Co. 6
White Eng. Corp., The J. G. . . 29
Wish Service, The P. Edw. . . . 21
Wood Co., Chas. N. . . . . 28



"Axle Specialists Since 1866"
Address all Mail to Post Office Box 515, Richmond, Va.

CAR AXLES
J. R. JOHNSON AND CO., INC.

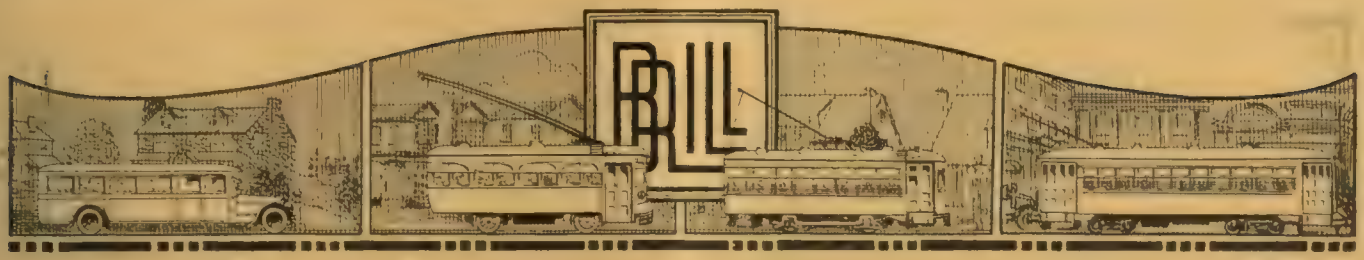
FORGED STEEL AXLES
For Locomotives, Passenger, Freight and Electric Cars
Smooth Forged or Rough Turned—Carbon or Alloy Steel—Plain or Heat Treated, Forged and Turned Piston Rods, Crank Pins, Large Shafts, Round Bars, etc.

*Only reliable products can be continuously advertised*

Northern CEDAR POLES Western
We guarantee
all grades of poles; also any butt-treating specifications
BELL LUMBER COMPANY
Minneapolis, Minn.



STUCKI SIDE BEARINGS
A. STUCKI CO.
Oliver Bldg.
Pittsburgh, Pa.






# Trenton & Mercer Co. Trac. Corp.

## New City and Suburban Cars

Twenty light-weight, one-man two-man cars of this type were recently built in our Philadelphia Plant for Trenton, N. J. Ten cars include quadruple 25 Hp. motor equipment for city service, and ten are equipped with quadruple 35 Hp. motors for suburban service. Otherwise, the cars are practically identical, being mounted on Brill 77-E low-level trucks equipped with Brill Twin Swing Links, measure 44 ft. long over platforms, and seat 48 passengers.

The city cars weigh 34,476 lb. and the suburban cars 36,746 lb.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

AMERICAN CAR CO — ST LOUIS MO — G C KUHLMAN CAR CO — CLEVELAND OHIO — WASON MANFG CO SPRINGFIELD MASS

AURORA, ELGIN AND FOX RIVER ELECTRIC COMPANY
AURORA, ILLINOIS

September 4, 1924.

MR. A.P. JENKS,
Railway Department,
General Electric Co.,
Illinois Merchants Bank Bldg.,
Chicago, Illinois.

Dear Mr. Jenks:-

Noticing your adv. on the back cover of the Electric Railway Journal, August 30th issue, where your company very graciously used photographs of our cars, I thought perhaps it would be interesting for you to know that we have now had our city cars, which are equipped with the GE-264 motors, in operation one year, each car averaging approximately 4200 miles per month. Our interurbans with the GE-265 motors have only been in operation approximately nine months, averaging 5000 miles per month. Now that our summer business is nearly over, we are taking down all motors, making a complete and thorough inspection, cleaning all parts. I am certain it will be interesting to your company to know that we have not as yet had one failure in any of the GE-264 motors and only one failure in the GE-265 motors, this being occasioned by the motorman's mis-use when stuck in a snow drift with one pair of trucks off track last February.

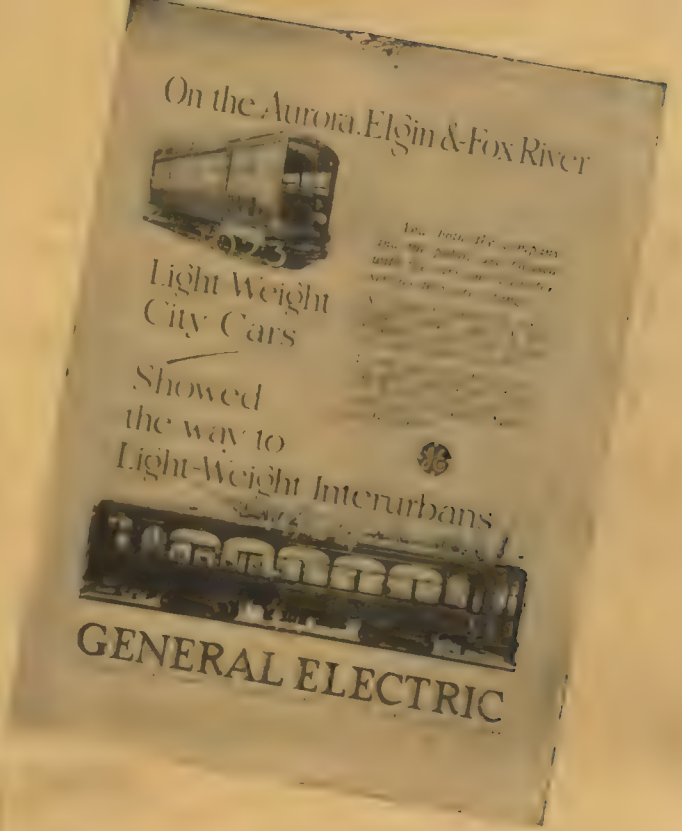
To me this is a wonderful record, where equipment on forty-seven cars has stood up as this equipment has and not suffered one failure of any description. If this information is of any value to you, you may use these figures to whatever extent you may desire.

With kindest personal regards,

I beg to remain,

Yours very truly,

GENERAL MANAGER.




## More Modernization Results

G-E modern equipment on this middle-west road is living up to the high standard it has set on many other progressive properties.

General Electric Company
Schenectady, N. Y.

11-1

GENERAL ELECTRIC


BOUND BY